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Vol. 5 September, 1958 No. 3

THE RELATION OF HUMAN GENETICS TO DEMOGRAPHY
Jean Sutter, M.D.

DARWIN REVISITED
Harold F. Dorn

CHANGING ATTITUDES TOWARD HUMAN GENETICS AND EUGENICS
Amram Scheinfeld

American Eugenics Society, Inc.

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NOTES OF THE QUARTER

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Contents

The Relation of Human Genetics to Demography, JEAN SUTTER, M.D. 131–136

Darwin Revisited, HAROLD F. DORN 137–144

Changing Attitudes Toward Human Genetics and Eugenics, AMRAM SCHEINFELD 145–153

Birth Control in a Rural Area of Puerto Rico, WILSON M. WING, M.D., MATTHEW TAYBACK, CLARENCE J. GAMBLE, M.D. 154–161

Factors Operative in Mate Selection in a Philippine Village, ETHEL NURGE 162–168

Book Reviews

"Effect of Radiation on Human Heredity" (WHO), NTINOS C. MYRIANTHOPOULOS 169–170

"Il Problema Dell'Eredita Nelle Malattie Reumatiche" (Teodori and Serneri) FRANK DEMARINIS 170

"Problemi Di Genetica Medica in Campo Endocrinologice" (Teodori), BERTHA ASCHNER, M.D. 170–171

"Natural Selection in Man" (Spuhler), BARUCH S. BLUMBERG, M.D. 171–172

"Live at Peace With Your Nerves" (Alverez), ARTHUR J. BACHRACH 172–173

"Applications of Demography" (Population Association of America), GEORGE F. MAIR 173–175

"The University Teaching of Social Sciences: Demography (Glass), DOROTHY GOOD 175–176

Periodical Reviews

Genetics, GORDON ALLEN, M.D., CHARLES M. WOOLF 177–180

Population, GEORGE F. MAIR 180–185

Excellence in Education (Rockefeller Report on Education) 185–186

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Vol. 5, No. 3, September, 1958 *Eugenics Quarterly*

THE RELATION OF HUMAN GENETICS TO DEMOGRAPHY

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SINCE 1945 THE SCIENCE OF HUMAN GENETICS has been developing rapidly. Special treatises were revived by publications written in the perspective of true genetic progress (e.g., the books of C. Stern, J. Neel, and W. Schull). For the first time a World Population Conference devoted an important part of its sessions to genetics (Rome, 1954). Two years later, in 1956, the First International Congress of Human Genetics was held in Copenhagen. As in other branches of genetics, some knowledge of human heredity has been established, and well-defined specialities have been rapidly growing. Three principal groups may be noted: medical genetics, genetics of the blood groups, and genetics of population. Each of these three progressed on its own initiative, without relying on the findings of the others. This regrettable situation has jeopardized the progress each has been able to show by itself. Analysis in each field has made more difficult the valuable synthesis necessary for united progress.

In reviewing this situation the following should be considered: (1) the vital connections which should be established between genetics and demography; (2) the communication which should exist between genetic study of the individual and the genetic study of population.

Demographic Study

First and foremost, we have to specify the aspects which have been brought out by quantitative or qualitative population studies; as a matter of fact such demographic techniques should be more used by geneticists.

When the state of a population is considered in demography, three types of factors emerge: (1) biological, (2) socio-economic (3) cultural. The first type is concerned with the biological structures and characteristics of individuals and groups, and here genetics obviously plays an important role. Socio-economic factors encompass all characteristics of social class in relation to economic means: wages are generally the measure of social and professional position. Within a same biological structure, we know that important characteristics such as child growth, life expectancy, and general morbidity vary according to income and that quality of diet appears to be a principal factor responsible in each instance. When wages and social class are equal, biological and demographic characteristics vary again according to culture, i.e., religion practiced, standard and type of education, etc.

These three groups of factors, defined as above, react simultaneously upon each other to give the family or group its particular demographic characteristics, the basis of which is fertility and mortality. Students of human genetics should always keep these factors in mind in order to evaluate properly phenomena observed at different levels of research.

Modern demography has shown that certain factors exist which are capable of molding individual or group characteristics. A real demographic biology, with which genetics must reckon, has been created in the course of the last decades. Among these factors should be noted the age of the mother, space between children (intervals between successive births), and order of birth.

Maternal age influences sterility of different types: couples with one child unable to have a second, those with two incapable of having a third or a fourth when they have three, and so on. This sterility increases with duration of marriage and is so important in correctly evaluating the fertility or sterility of a group of families or of populations that the matrimonial history of each family must be known. The value of the coefficients of sterility, SO, S1, S2, etc. vary in accordance with the age of the wife; it increases regularly up to 35 years of age, and more rapidly from then on. No doubt the influence of aging exists, but comparison of sterility rates S1, S2, S3, shows that acquired sterility in marriage is, up to 30 years of age, greater than that involved in aging. From 35 years of age on, sterility following a birth seems to diminish slightly with the order of that birth. These data are applicable only to populations whose behavior is not Malthusian. The study of the above problems is much more complex in populations using birth control.

The age of the mother acts as an influence again on the frequency of twin births, both dizygotic and monozygotic, which frequency rises with age. Spontaneous abortions also increase with age. Their percentage, in relation to conceptions, doubles between the 15-24 year age group and that from 30-34. Stillbirths also vary in the same way with maternal age. The figures observed in a number of countries for the S2 class of birth indicate that birth fatality doubles between the age of 20 and 33 years, i.e., from 20 to 45 per thousand births. If we know that mortality at birth is, on the other hand, dependent upon biological factors (the sex-ratio is high here) and socio-economic and cultural factors, we appreciate still more the importance of the demographic factor.

We could cite, with figures to support it, the determining action of the order of birth and the spacing between conceptions on certain individual or family characteristics, but examples must be limited here. They amply show, however, that those who wish to study the influence of genetic structures on sterility, fertility, mortality and morbidity should consider these factors very seriously.

Biological characteristics, controlled by demographic factors, illustrate very well the importance of the structures of populations where genetic cases which have been studied can be located. The age of the individuals observed, their marital or professional status, their life expectancy, and the size of their families are matters of particular interest to both geneticists and demographers. To state these matters more precisely, a complete list of these points established by T. Larsson will be given later.

Medical Genetics

Medical genetics plays an essential role in our knowledge of abnormal or pathological characteristics. Its morphological descriptions, anatomic or histologic, are of primary interest, but its vast domain remains limited in regard to certain projects. For example, in determining whether one or a number of genes cause the appearance of a pathological characteristic, the matter apparently cannot be resolved if observa-

tion is limited to a few individuals or families. We now know that polygenic characteristics are very diffuse in man. Because of this knowledge the solution to the above problem is automatically transferred to the realm of population, and thence to demography. The resolution of these important aspects of medical genetics is becoming a matter of census analysis or exhaustive investigations by sampling or not. Only by gathering together individuals belonging to numerous demographic cohorts, can we then succeed in solidly establishing the essential data. The determination of dominance or recessiveness is also becoming a problem relating to population. Neglect of this essential principle sometimes results in the same anomaly frequently being described as recessive by one author and as dominant by another. The definition of penetrance and expressivity suffers from the same omission. The concept of penetrance used readily by certain authors is now repudiated by others.

Moreover the selective material which medical genetics generally uses, mostly derived from hospital cases, results from a statistically large selection. It is uncertain whether this material represents what actually exists in the population from the point of view of heredity and gene distribution. Most of the time the observations are not inductively useful in establishing data characterizing a certain large population. For example, to understand the damaging effect of a mutation on a population and to establish its state of equilibrium, it is important to know the fitness of the individual affected by the anomaly, or even of the carriers of the gene or genes involved; this fitness can be determined only within a strict demographic framework. Socio-economic and cultural factors are of similar importance; here one badly worked-out observation can lead to erroneous results. We know in France (Croze and Febvay) that the meaning of child mortality varies considerably with occupation: exactly 1-7 from the professionals to the unskilled laborer. With these conditions prevailing, it can be seen, that of the studies made, only a few careful ones can give evidence of the injurious effects in proportion to the true action of the mutations. Only heavy genetic activity (such as the effects of consanguinity) can double the rate of infant mortality in a demographically harmonious population. By limiting studies of this kind to a framework of fitness or to certain age or occupational groups in the population, it is easy to see that findings can be in direct opposition.

For example, we regret that the leaders of the extremely interesting investigation of the effects of atomic bombing in Japan did not think of determining, in the many families studied, the rate of sterility provoked in the different orders, S1, S2, S3, which have already been discussed. No doubt such an approach would have helped explain the differences observed in the sex-ratio.

We are not attempting here to place on trial the worth of medical genetics as much as scientific methods. We have simply tried to stress that the results of studies in medical genetics, which are related to population, are most of the time suspect if not quite far from the truth. It has become necessary for medical genetics to change its methods of investigation in certain ways. It must now work closely with demography, using its techniques more frequently so that fields of investigation may be more rigorously defined and medical genetics can pursue its proper research protected from serious errors. For the same reason medical genetics must work hand in hand with the genetics of population, without which it cannot in the future maintain the necessary synthesis of its achievements.

Genetics of the Blood Groups

The genetics of the blood groups can be reviewed in the same way. Many authors who have defined these groups in populations, either primitive or advanced, have ignored demographic data. Seldom is the

distribution of blood groups considered in a population according to age groups. Nevertheless, this is a fundamental consideration, since very often the concept of blood groups is a dynamic one implying evolution from one generation to the next. Only in the last few years has this important point commanded the attention of any but a few specialists. Bentley Glass (1954) expressed it in this way: "Age-group analysis may also assist in exploring the effects of selection upon genetically determined traits. The estimation of mutation rates from population equilibrium may also be better justified if it can be shown by age-group analysis that with respect to the alleles concerned the population really is in equilibrium. In short, age-group analysis promises in the future to become an invaluable method."

Consider also that specialists in the blood groups up to now have been little concerned with using the data from genetics of population and demography. In the book by Race and Sanger—a masterpiece in this field—one searches in vain for an indication of the demographic problem; and in that of Mourant, although the isolate is the subject of a special chapter, the account remains a summary one and the essential problems of demography and the genetics of population are omitted. Yet thorough understanding of these problems is necessary to comprehend the meaning of the distribution of different blood groups in the scheme of anthropology.

Unfortunately champions of this branch of genetics wishing to use data from the genetics of population have not always fully grasped it. We shall limit ourselves to two examples. In his book, "Genetics and the Races of Men," W. C. Boyd, in investigating the effects of consanguinity on the distribution of different blood groups, is astonished that the endogamy practiced to a high degree in a village of Lebanon only slightly disturbed the size of the blood groups. This situation is normal. One essential aspect of the problem has simply been overlooked: gene frequency. Patterns of genetics of population show that consanguinity is able to act only slightly, if at all, on very diffuse genes. The more uncommon the genes the stronger the action of consanguinity. For such reason the distribution of very diffuse genes is relatively independent from the size of the group, whereas that of rare ones depends much upon it. Owing to this phenomenon, it is obvious that *simultaneously* most of the genes follow the Hardy-Weinberg law (whatever the size of the population, or the degree of consanguinity or homogamy) whereas uncommon or very rare genes follow more intricate laws of evolution. This has been experimentally verified (even on the level of blood groups) and is the whole basis upon which variation of human groups is founded.

Another example may be cited here. Failure to consider demographic factors and data from the genetics of population has led to the questioning of the worth of isogenes, i.e., the origin of the distribution of blood groups in geographic areas. It was believed for a long time that the blood groups of the ABO system were uniformly distributed within very vast geographic areas. Using the methods of geographers, specialists traced these distributions throughout the continents. It is certain that the isogenes obtained in this manner, often based on previous generalizations, were frequently contradicted by closer study. Fraser-Roberts has shown in the north of England the existence of great variations in the frequency of the ABO groups among localities not far distant from each other. This finding is confirmed by data acquired by genetics of population in the study of the development of isolates. We have recently shown that the most endogamous parishes, in rural populations in Western France, are also those where matrimonial migrations extend geographically across the longest distances. On the other hand in limited areas the curves of genic dispersion, from one parish to another,

do not follow one normal law but are leptocurtic. The genetic homogeneity that presumably would have been established after the break-up of isolates is not so complete as previously thought. The warning of Mourant at the First International Congress of Human Genetics at Copenhagen (*Proceedings*, p. 354) cannot be agreed with. ". . . There is a danger of exaggeratting the importance of local variations in ABO frequencies which might have been missed in a less detailed survey." Facts are facts, and we can anticipate that the actual classifications and their isogenes will be the object of serious re-examinations.

We confine ourselves to such findings which illustrate very well how urgent it is to compare the data acquired separately by demography and by the diverse branches of genetics.

Genetics of Population

The genetics of population is closest to demography since, theoretically, the models it supplies to medical genetics and to the study of blood groups should consider the demographic data which is at its foundation. Demographic factors, which in the course of time have affected the distribution of genes, have recently been the object of interesting syntheses, of which those by F. Osborn (Rome, 1954; Copenhagen, 1956) and T. Larsson (Copenhagen, 1956) are the most complete. Here are quickly listed the most important points according to Osborn (1956): (1) Rise in life expectancy has brought a decline in genetic selectivity; (2) The average size of families, which has been considerably reduced, has had an effect on the distribution of genes, but to what extent we do not yet know; (3) The spread of birth control, in emphasizing fertility differentials, has also had an effect upon gene distribution; (4) The break-up of isolates alone has contributed to changing individual genetic structures by means of assortive mating or other mechanisms; (5) assortive mating which has certainly become general in our time, in the sense of a homogamous or heterogamous emphasis, may have succeeded in disturbing old genetic balances.

T. Larsson has provided a more systematic though not opposing synthesis than that of Osborn. We shall note his headings to indicate the viewpoint of his study: (1) Size and geographic and social delimitation of the total and the reproducing population; (2) Length of life and age-distribution of the population; (3) Sex-distribution, especially disproportions in marriage age-groups; (4) Marriages; (5) Fertility and birth rate; (6) Migration, especially selective influx and removals; (7) Morbidity and mortality within different groups of the population; (8) Advance in the science of human genetics; (9) Public health; (10) Social, occupational and economic conditions; (11) Legislation; (12) Changed knowledge within the population about the heredity of certain diseases; (13) Disturbances of normal development.

These thirteen points demonstrate perfectly the factors which genetics of population, at the level of population and throughout the different branches of genetics, must consider in order to evaluate the distribution of genes and the meaning of the recorded data. Everyone who is gaining awareness of these patterns will appreciate the immense effort still necessary to succeed in understanding with accuracy what happens in a population within the framework of a genetics dealing with evolution.

Conclusion

This rapid examination shows how necessary it is constantly to relate all branches of human genetics in an effort to reach an open synthesis. In his book, "Les Illusions Evolutionnistes," the French philosopher Lalande wrote: "Each day it becomes more urgent to solve this vital problem for human intelligence: to reestablish the communication and unity between the sciences which, divided, threaten to become ineffective." This statement is already true for

genetics alone. It is particularly absurd, in this sense, to see develop, without a solid bond being established, medical genetics and genetics of population on the one hand, and biometrical genetics and genetics of the blood groups on the other. Because of this dichotomy certain areas of human genetics are being disastrously retarded, as is also physical anthropology, which having amassed innumerable metrical achievements from 1850-1950 still has so much to accomplish within the genetic framework. Here an understanding of the heredity of normal characteristics in man has not yet been satisfactorily developed. This, moreover, is an area where biometrics ought to associate closely with genetics which implies a development of corresponding mathematics.

It is interesting to note that the most important progress which has been recently accomplished in human genetics was only due to close collaboration between different branches of science. If Allison realized his beautiful work on polymorphism of falciform anemia, it was because he could unite the medical and racial aspects of molecular research with data on genetics of population. The problem of natural selection advanced a step when Aird conceived the idea of collecting all the cases of stomach cancer, according to the blood groups of individuals, and comparing them with the normal distribution in a population. These are examples of collaboration which should be emulated.

Human genetics is at the crossroads. Before it lies immense problems: linkage, polyfactorial heredity, association between characters, biometrical and statistical analysis, physical anthropology. It must, on the other hand, also endeavor to create a valid eugenics. Can all these very important problems be solved if they are left in confused order? A vast reorganization of learning is necessary.

Human genetics is not a popular science in the world at large. Investigators are provided with only scant financial resources which should not be carelessly expended. There must be a serious reformation of methods in the years to come if this important science is to be saved from falling into confusion.

DARWIN REVISITED*

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Editor's Note: Charles Darwin's first public statement about the origin of species was published just one hundred years ago. The centenary of this epoch-making event is being celebrated all over the world.

MORE THAN ONE MILLION known and described species of animals and plants live on the earth. This is not a complete inventory of all living species since new types continually are being identified. They vary in size from the ultra-microscopic viruses to the giant sequoia and the huge blue whale; in complexity from the single cell amoeba to animals with billions of cells; some manufacture their own food while others can exist only by devouring another species. They live in all kinds of environments—in deserts and arctic wastes; in the darkness of the ocean depths; in the air, water, and soil; in forests and grasslands. Although diverse, this multitude has one thing in common—every species is governed by the same biological laws.

Of these species of organisms, only man can in part control and modify his environment. As a result of this ability man now occupies and dominates the earth to an extent probably never before approached by any other species. This dominance is very recent and constitutes a situation to which man still is far from adjusted.

It does not free him, however, from the inexorable working of the biological laws that govern all living organisms. The multitude of microorganisms over which man is temporarily dominant have not been banished from the earth. They are still striving to regain their former status. How long man will continue to enjoy his newly gained dominance will depend to a large extent upon how wisely he exercises his abilities and knowledge. The struggle for existence still goes on.

The origin of man is concealed in the dim past. The direct ancestors of *Homo sapiens* possibly had become differentiated early in the Pleistocene period which began 600,000 to 1,000,000 years ago. The present subgroups of *Homo sapiens* may have existed for as long as 100,000 years. Skeletons of modern man dating from 50,000 to 80,000 years ago have been found in caves in Europe. These dates are largely conjectural; of the millions of persons who have inhabited the earth, skeletal remains have been found of only a very few who lived prior to relatively recent times and these remains are mainly fragments of skulls.

During all but the most recent years of the centuries of his existence man must have lived, reproduced, and died as other animals. The increase in his numbers was slow and governed by the availability of wild food sources. Like other animals, *Homo sapiens* was subject to the three great regulators of population size—pestilence, privation, and warfare. Among all species except *Homo sapiens* the killing of one animal by another is primarily for food. Only man has developed the practice of killing others solely for the purpose of gaining dominance.

Approximately a century ago Darwin

*Adapted from presidential address before the Population Association of America, May 3, 1958 in Chicago, Illinois.

and Wallace independently proposed the Theory of Natural Selection in explanation of the process by which existing species of plants and animals have been derived from earlier forms. With modifications made necessary by the subsequently developed knowledge of genetics, this theory is accepted today by most scientists.

Among the essential features of the Theory of Natural Selection are: (a) the mass production of offspring resulting in (b) a struggle for existence not only between species but also between members of the same species; (c) the introduction of variation through mutation and gene recombination and (d) the hereditary transmission of characteristics.

The evolutionary process has endowed most species with a reproductive potential that, unchecked, would overpopulate the entire globe within a few generations. The tape worm, Taenia, may lay an estimated 120,000 eggs per day; an adult cod lays possibly four million eggs per year; a frog will produce as many as 10,000 eggs per spawning. Under favorable conditions a pair of English sparrows would have 276 billion descendants in 10 years. The human ovaries are thought to contain approximately 200,000 ova at puberty while a single ejaculation of human semen may contain 200 million spermatazoa.

The almost incomprehensible reproductive potential illustrated by these figures is kept in check by interspecies competition in the struggle for existence, by disease, and by limitation of the available food supply. Not only are large losses of eggs and young characteristic of most species but, perhaps of equal importance for the preservation of a species, few adults survive for more than a small fraction of their potential life span.

This may be illustrated by counts of survivors of a squirrel population in a game refuge. In captivity, squirrels may live at least 15 years. Of 100 squirrels born in the wild, 53 survived 6 months, 29 survived one year, and 8 survived two years; only one per thousand lived to see its sixth year.

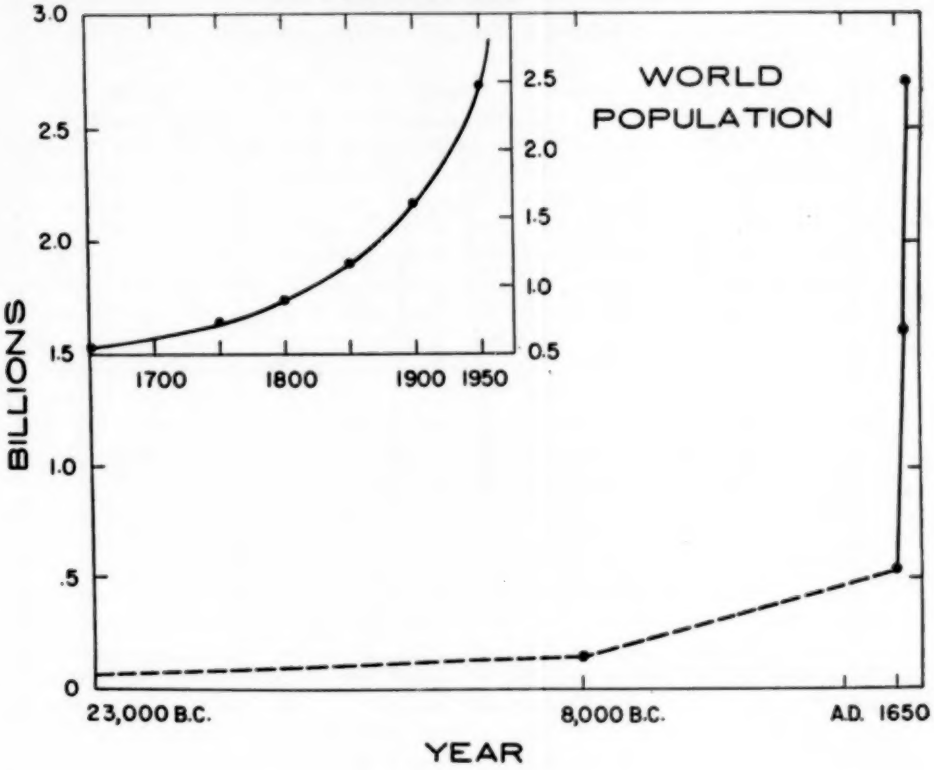
Homo sapiens has lived and died in much the same way until a few decades ago. We often forget how recently man has gained control over pestilence and famine. In 1832, 1849, and 1854 epidemics of cholera raised the general death rate in New York City to a level of more than 45 per 1,000 per year. It was not until the 1870's that the crude death rate in New York City permanently fell below 30 per 1,000. The people of western Europe have been free from the specter of famine for only slightly more than a century. The last great famine was that of 1846-47 in Ireland. The total mortality from all causes during the five years ending in 1851 is estimated at nearly 1,000,000 persons, or one-eighth of the population of Ireland just before the famine.

The increasing control over the forces of high mortality has removed part of the controls on the high reproductive potential of man with a consequent absolute increase in population size unparalleled during his long history. (Figure 1) There is ample evidence to demonstrate that the recent spurt in population growth is due to a decrease in mortality and has occurred in spite of a general decline in fertility.

The size of the world's population 25,000 years ago, the approximate end of the last glaciation, is unknown but probably did not exceed more than a few million in number. The subsequent increase in size undoubtedly was very slow and was interrupted by periods of actual decrease. Following the discovery of agriculture and the domestication of food-supplying animals about 8,000 B.C. to 5,000 B.C., man gradually became less dependent upon wild sources of food. A more stable and abundant food supply undoubtedly speeded up the absolute increase in the total population.

All of this is largely conjecture and the dotted line from 23,000 B.C. to 1650 A.D. in Figure 1 should be regarded as nothing

FIGURE 1. Estimated population of the world 1650-1956 and schematic representation of the net increase in population from 23,000 B.C. to 1650 A.D.

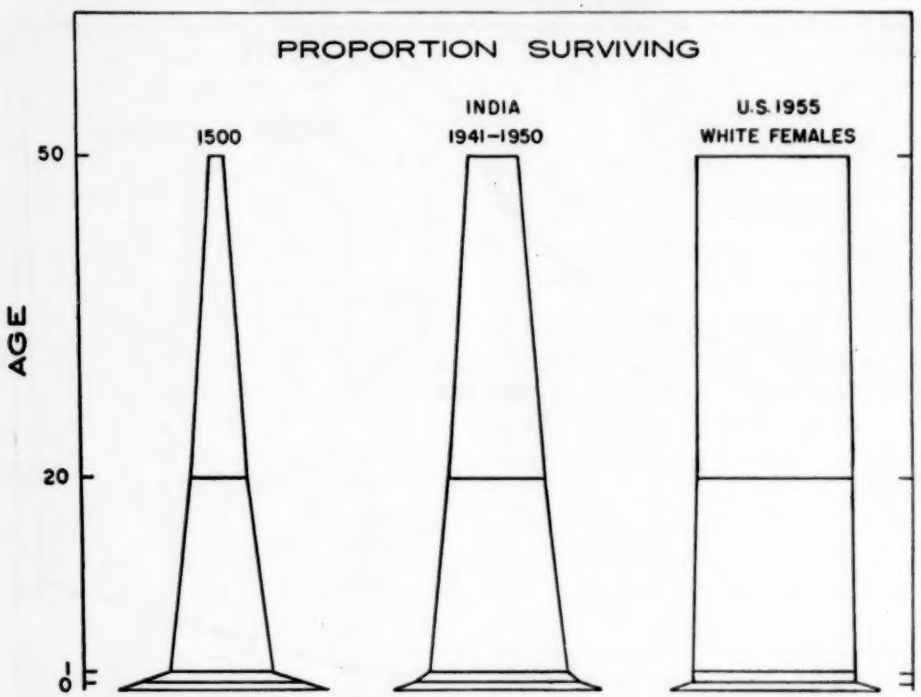


more than a rough representation of the change in population during this period. The actual change almost certainly was not linear; the trend line is designed to suggest that the growth of population during this period was very slow.

The first reasonably accurate estimate of the world's population is a figure, due to Carr-Saunders, of about 500 million around 1650. Three centuries later, 1955, the United Nations Demographic Yearbook gave the world's population as 2.7 billion. During the past century alone, the net increase in the population of the world has exceeded the total number of persons accumulated during the preceding millenia of human existence.

So rapidly has this change taken place that toward the end of the nineteenth century, representatives of the entire range of cultures since the middle Pleistocene, 300,000 to 400,000 years ago, could still be found. When Great Britain took possession of Tasmania in 1803, it was inhabited by a dark, woolly-haired people who lived by hunting and food-gathering and who had no domesticated animals, not even dogs. Their only weapons were clubs, stones, and pointed sticks similar to early Stone Age spears. Their chipped stone tools were as crude as those of the Neanderthal man. The Tasmanians would have been regarded as savages by people of the latter part of the Stone Age who already

FIGURE 2. Estimated proportion of female conceptions surviving to the end of the reproductive ages.



had specialized bone and flint tools and cave paintings. The last Tasmanian died in 1876.

The recent spectacular spurt in the growth of the world's population has been the direct result of a rapid decline in mortality rates which has lead to a sharp increase in the average length of life. Although accurate statistics do not exist, the expectation of life at birth in Greece, Rome, and Egypt during a period of approximately 500 years around the birth of Christ probably did not exceed 30 years. By 1900, it had increased to about 45-50 years in North America and most western European countries. A figure of 68-70 years has now been attained by the population of many of these countries. Thus the increase in expectation of life at birth during the past half century has been as great as or greater than that during the previous two thousand years.

An important effect of the decline in mortality rates often is overlooked, namely the increase in effective fertility. Figure 2 portrays the change that has taken place in the proportion of female conceptions that survive to the beginning and to the end of the childbearing period. Although the left diagram is labeled 1500 A.D., it could just as appropriately represent any date near that period.

The percentage of conceptions that are live-born is assumed to be the same for all three diagrams—80 per cent. Around 1500, only about one-quarter of conceptions sur-

vived to age 20; in the United States in 1955, the corresponding per cent was 78. From 5 to 8 of each 100 female conceptions during the earlier period lived to the end of the childbearing period, age 50 years, as compared to 74 of each 100 in the United States according to the mortality rates of 1955. The proportion of female conceptions living to the beginning of the childbearing period now is four times greater than in 1500; the proportion surviving to the end of the childbearing period is 10 to 15 times greater. A corresponding decline in the per capita fertility rate would be required to prevent this increase in survivorship from resulting in a rapid increase in population.

By 1950, only a small minority of the world's population had achieved an expectation of life at birth comparable to that of the population of the United States. Large numbers could anticipate mortality conditions no more favorable than those shown for India in Figure 2, a level reached by western Europeans during the eighteenth century.

During the past decade, the possibility of achieving a twentieth-century death rate within five to ten years has been opened to the masses of the world's population that still had an eighteenth-century death rate in 1940. The decline in mortality of the Moslem population of Algeria shown in Figure 3 illustrates what can be achieved by the application of existing knowledge.

In 1946-47, the death rate of the Moslem population of Algeria exceeded that of the population of Sweden in 1771-80, the earliest date for which accurate mortality statistics are available for an entire nation. During the next eight years the drop in the death rate in Algeria exceeded that in Sweden during the century from 1771 to 1871. The world-wide reduction in mortality is the most significant demographic event during the past decade and symbolizes both the extent to which man now can control his environment and the rapidity with which this control has been achieved.

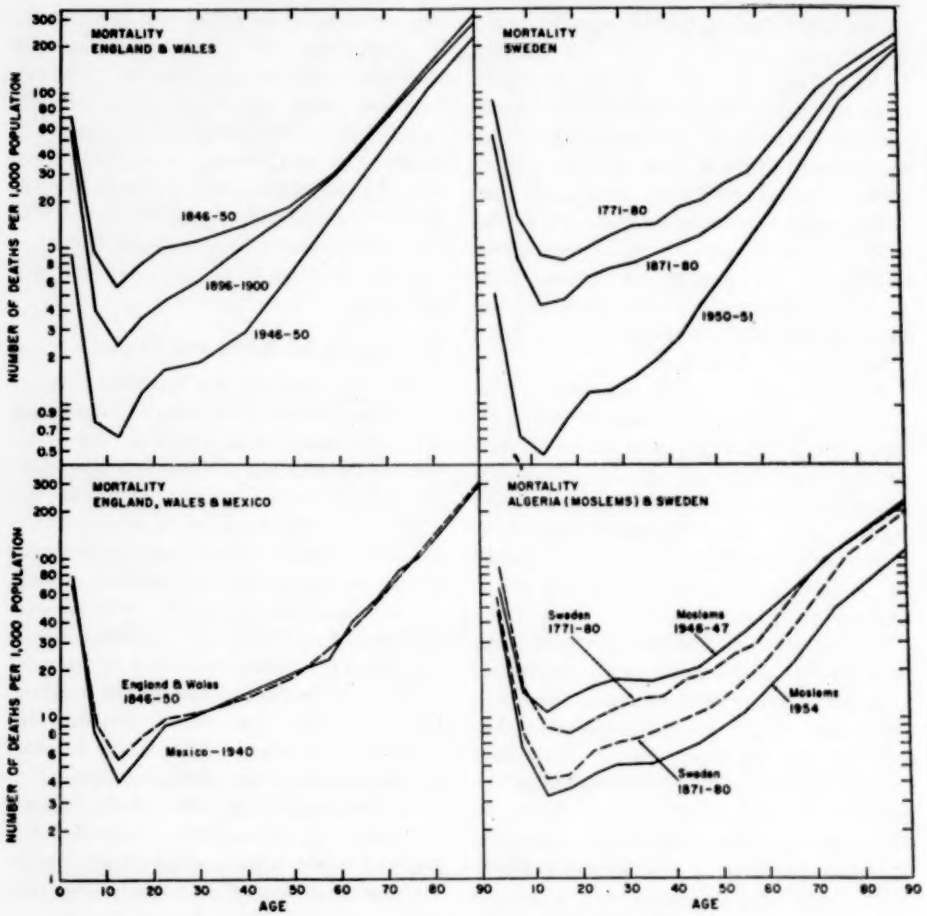
Man is as yet far from adjusted to his newly gained control over his environment. For the first time, a biological organism can consciously influence the direction of its evolution. We cannot foresee today how man will use this ability. We can, however, point out areas where patterns established in the past have been upset and where new adjustments must be worked out. I shall mention only three such areas: (a) the balance between births and deaths, (b) the process of natural selection, and (c) the location of centers of power and influence.

The Balance of Births and Deaths

Man has learned how to control two of the three historic governors of population increase—disease and famine. The third, war, in the past has not been an important direct regulator of population size in contrast to the importance of its analog among all other species of animals, namely the killing of one animal by another for food. As man has gained effective control over disease and famine, he has simultaneously magnified his ability to destroy all forms of animal life including himself by warfare. However, man can choose whether his knowledge of atomic fission shall be used for his benefit or for his destruction.

Nullification of the effect of the historic governors of reproductive potential has resulted in the current spurt in population increase at a rate that cannot long continue. If unchecked, the present rate of increase would generate a population of 60 billion persons in less than 200 years, an insignificant interval in comparison to the past history of man. It seems inevitable that man must consciously reestablish control over his reproductive potential and lower his birth rate to the level of his death rate within the next century and a half. If he does not, he will lose his power to control his future and the former regulators of population growth will once again reign supreme.

Figure 3. Age-specific death rates per 1,000 per year for Sweden, England, and Wales, Mexico, and the Moslem population of Algeria for various time periods, 1771-80 to 1954.



The Process of Natural Selection

Man is now in the fourth main stage of civilization, the scientific, having passed through three previous stages, hunting, agricultural, and industrial. During each stage, he has extended his ability to modify and control his environment until science finally has given him the power to direct the course of his evolution.

The three principal effects of this development that are relevant to this discussion are (a) the separation of sexual gratification from reproduction by means of contraception and telegenesis, (b) the virtual elimination of lethal selection as an important factor in natural selection, and (c) the establishment of culture as a guiding force in the future biological evolution of man.

As shown by Figure 2, three-fourths of all conceptions or more than 90 per cent of all live female births survive to the end

of the childbearing period in the United States, Canada, Australia, New Zealand, and most of the countries of central and northwest Europe. There is every reason to believe that the proportion of conceptions that survive to reproduce will continue to increase. It is now considered practicable to eradicate diseases such as smallpox, yaws, urban yellow fever, malaria, cholera, plague, and typhus whereas only a few years ago the most that could be hoped for was partial control. Rapid advances are taking place in surgery and in the transplantation of tissues, bones, and arteries. The successful transplantation of entire organs is an imminent possibility. The replacement of diseased vital parts of the body such as arteries and heart valves with synthetic inert substitutes is an accomplished fact.

The genetic effect of the virtual elimination of lethal selection is not clear. Selection exists only if by differential survival and fertility, individuals of one generation are disproportionately represented by progeny in the succeeding generation. What will be the effect of the survival of persons with genetically determined defects, for example juvenile diabetes, to the childbearing ages? Will differential fertility become less marked as the necessity of limiting family size in order to control rapid population growth becomes more apparent?

Society has gradually limited the right of an individual to destroy life by killing another human being until now such action is forbidden. Will the elimination of lethal selection and the restraining effect of mortality upon the high human reproductive potential similarly force society to limit the right of an individual to create life?

Location of Centers of Power and Influence

The place of the origin of *Homo sapiens* is unknown. Now extinct forms of man have been found in Asia, Africa, and Europe. Early in his career, two main groups of *Homo sapiens* became established, one in southeast Asia and the other in the region around the eastern Mediterranean . The history of the world, and in particular that of the western world, is largely a history of the development of the latter group. Until recent times the numerically larger population inhabiting southeastern and eastern Asia and adjacent islands has played a minor role in world history.

Throughout the history of the western world, a succession of relatively small population groups have become dominant due to superior knowledge and technology and have ruled their neighbors. At first, the region of dominance was comparatively small. The empires of Assyria, Babylonia, Persia, and Egypt are characteristic of this period. Each succeeding dominant group has extended its sphere of influence until by the end of the nineteenth century, the entire world was dominated by a small group of people of western European descent.

Alexander the Great extended the power of Greece throughout Asia Minor and to the very heart of India. His empire was more extensive than any before his time. His early death prevented the further extension and consolidation of his empire and it soon broke up. Alexander the Great was followed by the Romans who dominated the entire Mediterranean region, most of Asia Minor, western Europe, and England.

Until about the time of Galileo and Francis Bacon, new discoveries and inventions were largely hit or miss. Following the Renaissance, the systematic search for new knowledge gradually gained increasing support. It now is an essential and integral part of our modern civilization. The search for new knowledge and the subsequent technological development flourished most extensively among the populations of the countries of western Europe and led to their virtual domination of the entire world by the end of the nineteenth century.

Around 1500 the population of Europe probably did not exceed 100,000,000 or perhaps 15 to 20 per cent of the world's population and occupied about 7 per cent of the land area of the earth. Four hundred years later, in 1900, the descendants of these people numbered 550 million or one-third of the population of the world. They occupied or controlled five-sixths of the land area of the earth. They had seized and populated two great continents, North and South America, and one smaller continent, Australia, together with its neighboring island, New Zealand; they controlled a fourth continent, Africa, and dominated Southern Asia and adjacent islands.

The English-, French-, and Spanish-speaking peoples were the leaders in this empire building with lesser roles being played by the Portuguese and Dutch. The Belgians and Germans participated only toward the end of this period of expansion. Of these, the English-speaking peoples profited most.

The population of England around 1500, the start of this period of expansion, is unknown but probably did not exceed four or five million. By 1900, the English-speaking population numbered 129 million and occupied or controlled one-third of the land area of the earth and with the non-English-speaking inhabitants of this territory made up 30 per cent of the world's population. Never before in the history of the world had so few people been able to dominate such a large proportion of the total population and to control so much of the world's resources.

Since World War II the scientific knowledge and technological skill of the Europeans and their descendants have become available to the remainder of the world. In the past, most scientific discoveries have been made by a very small proportion of the world's population. Now the people of the U.S.S.R. and Japan must be included in this group and, in the not far distant future, the teeming millions of China and India. The tempo of discovery and change almost certainly will rapidly increase. It seems inevitable that the breaking up of the world domination by western Europeans and their descendants, which already is well advanced, will continue and that the focus of power and influence will shift toward the demographic center of the world.

The future will be marked by a dramatic increase in man's ability to control his environment provided he rapidly develops cultural substitutes for those harsh but effective governors of his high reproductive potential, pestilence and privation, that he has so recently removed. Whether man can use his scientific knowledge to guide his future evolution more wisely than the blind forces of nature, only the future can reveal. The answer will not be long postponed.

CHANGING ATTITUDES TOWARD HUMAN GENETICS AND EUGENICS*

AMRAM SCHEINFELD

IF THE GOOD Abbé Mendel were alive today, he might look over to the human geneticist and ask, "How does *your* garden grow?"

For those who have been taking periodic inventory of the science of human genetics, (as I have been doing for many years), the answer to how it was flourishing and what it had produced might have to be a so-so one: "Well, pretty good, but not good enough." By way of explanation we could go into the facts to be presented in this article.

First, then, it may not be a new observation that every science is subject to the "nature-nurture" principle. A science does not grow in a vacuum, but like an organism, is governed in its development by both its inherent potentialities and its external environment. For a science, the environment must include, among other things, the needs, interests and attitudes of the people of its time; and this applies to no science more strongly than to human genetics, which, because it deals so directly and intimately with human beings, has been most peculiarly sensitive to their reactions.

The "ivory tower" geneticist might of course resent the inference that his own work is to any major extent dependent on what the public thinks of it. Yet one has only to note how public demands and interests, and huge financing by government and industry, have enormously stimulated the growth and output of the physical sciences, as well as many other sciences, in the past few decades. What has been the story of human genetics in the same period?

Not long ago a brilliant pre-medical student, who had been planning to go into psychiatry, told me he would consider changing to human genetics as a career *"if"* (I quote him), "there was any substantial future in it." He wanted my honest opinion. I told him it all depended on whether he was thinking of the immediate future, or the *future* future. In other words, looking far enough ahead, human genetics as a profession may hold exceptional possibilities. But for the immediate present the cold fact must be faced that in practical terms of job opportunities, financial rewards and available research funds and facilities, it offers much less for the amount of training required than does almost any other profession.

To throw some light on the status of human genetics in the United States today, here are a few facts about the opportunities for study and teaching: Hardly 1 in 100 of all the colleges and universities in the country, and only about 1 in 10 of the accredited medical colleges, offer as much as a single semester course in human genetics. In the entire area in and around New York City, with dozens of colleges and hundreds of thousands of students, not a single insti-

*Adapted and expanded from a paper, "The Public and Human Genetics," given by the author at the First International Congress of Human Genetics, Copenhagen, 1956.

tution at this writing has a regular course in the subject or employs a full-time human genetics instructor. (For a few years Columbia University offered a graduate course in the science through its Institute of Human Variation, but the Institute became a casualty at the end of 1957.)

In the country at large there probably are no more than a dozen full-time human geneticists—i.e., those who make their living primarily in the profession,—and perhaps no more than two or three graduate students a year receiving Ph.Ds in this specialty. For the most part, those active in the field are part-time workers, usually not specifically trained as human geneticists, and including mainly medical men, general geneticists and some social scientists. But the great majority of American professional people whom one would expect to be actively interested in human genetics have little contact with it, and do little or nothing to encourage its teaching or research.[1]

Why is all this so? The answer cannot be simply that "human genetics is a new science." Actually, it is more than fifty years old—as old, if not older, than many other modern sciences which have made vastly more progress. Nor can one say that it is too theoretical, or indefinite, or of no practical value, for the useful application of its findings can be and is now being demonstrated in innumerable ways, as we shall show later. Nor, again, can one argue that it is lacking in popular interest, for it deals with the very essence of human lives and relationships. Indeed, this latter fact may hold the explanation we seek. For it is precisely because human genetics touches such sensitive spots in human lives that, far from having been met merely by indifference, it has incited a host of adverse reactions, such as perhaps no other science has encountered. And here we find the fate of human genetics interwoven with that of eugenics, which had preceded it by several decades and in some ways, as many see it, was at first the wicked stepmother in its story.

Specifically, a primary bias against human genetics arose from the fact that almost immediately after its entrance into the world, it was seized upon by the extremists of the early eugenics movement to support their theories regarding genetically superior and inferior classes, peoples and races, and their ideas for rigidly suppressing the breeding of all those whom they considered "unfit." Moreover, since some of the pioneer human geneticists were also leaders in the early eugenics movement and espoused its theories, human genetics and eugenics were for a long time looked on as synonymous in many eyes, and as equally questionable.

One can readily account for the extremist views of the old-line eugenists. In the first flush of the discovery (or rediscovery) of the Mendelian principles, almost every trait in any plant or animal was thought of as inherited through some simple genetic mechanism. With a quick jump from lower organisms to human beings, it was then assumed that virtually all human physical traits, including all defects and abnormalities not obviously due to accident, were also inherited through simple recessive, dominant or sex-linked genes: and that this simple unitary inheritance applied equally to good and bad behavior traits of every description, including intelligence, genius, honesty, decency, sobriety, etc., in contrast to stupidity, shiftlessness, depravity, criminality, etc. A number of studies of "horrible example" families, such as that of the "Kallikaks" (1912) went so far as to regard feeblemindedness, degeneracy, alcoholism, pauperism and criminality as the combined effects of a simple unitary genetic syndrome, which could be handed down for generations. (1) A 1915 monograph described "nomadism"

[1] The situation is not much different in other countries, except for Denmark, Norway and Sweden, where there has been much public and professional support for human genetics projects.

(or the wanderlust) as a simple sex-linked trait. A 1917 book listed as simple recessive conditions "hereditary alcoholism, hereditary criminality and hereditary hysteria." And another book reported "religious zeal" and "good taste in dress" among simple inborn traits. (We must remember that this was in the toddling days of human genetics, that workers in the field were groping their way, and that heredity as a whole seemed much less complex than we now know it to be. We must also, in all fairness, remember that many of the pioneer geneticists-eugenists blazed important trails in research, helped to develop useful techniques, and otherwise contributed importantly to the science of human genetics.)

At any rate, the foregoing easy views of human heredity also made possible the conclusion that the current world was divided between a minority of "fit" people, who had a corner on the "superior" genes, and a large majority of "unfit" people, who were chockful of "inferior" genes; and that humanity's fate and its chief hopes for betterment depended mainly on a drastic and immediate selective breeding program which would step up reproduction among the "fit" groups and radically reduce it among the "unfit,—one method to be by widespread sterilization which, it was thought, would get rid of most of the bad genes in a generation. Apart from the thinking in terms of groups rather than of individuals, and of ignoring the possibility that environment could account for many of the group differences, a not inconsiderable weakness of the old eugenists was the tendency to identify the "fit" people as belonging mainly (by no coincidence) to their own race and ethnic groups—primarily White Nordics of old-line American or English stocks—and the "unfit" peoples as members of other races and ethnic groups.

But almost at once, and gathering force as time went on, strong opposing voices were heard from most of the leading geneticists—Thomas Hunt Morgan, H. J. Muller, L. C. Dunn, Laurence H. Snyder, etc.—who pointed to innumerable scientific flaws in the extreme eugenic theories. What was also noted with concern was the damage the promulgation of these theories had done. Thus, Bentley Glass has written of the "fanatic views of the eugenists which ran [human genetics] into the ground." and Clarence P. Oliver tells of the long period when "the general public misunderstood the purpose and significance of human genetics, and many believed it was merely another term for sterilization or controlled breeding." (It is hardly necessary in this journal to point out that the new, and present, eugenics organization which subsequently came into being in the United States, bears little resemblance to the old one in its program or type of leadership, and is now looked on by most human geneticists as a constructive force in the development of their science.)

However, any harmful influence of the old eugenics movement was only one of the factors responsible for the antagonism and suspicion—or, at least, the indifference—toward human genetics. One of the most important reasons for the negative feeling about the science of human heredity was and still is the remarkable rise and growth of "environmentalism" everywhere in the world in recent decades. In this respect we might almost say that human genetics was born at the wrong time. For this has been the age of psychoanalysis, psychology and psychosomatic medicine, with sweeping emphasis on the effects of environment in every phase of human thinking, behavior and functioning. It also has been the age of political and social environmentalism, with widespread assaults on hereditary class structures. And throughout the world, the tremendous advances in health, learning and achievements, resulting solely from rapid changes in environment, have dwarfed in many eyes the importance of hereditary factors. Why bother about pos-

sible hereditary differences of a few years in longevity among families, when environment was suddenly adding decades to life spans of all people? How ominous were hereditary threats in the light of what recent wars had done to human beings and what another war could do?—or the defects and deaths that could be averted by preventing further wars? Why speculate about genetic differences in mental capacities when, merely by training, whole masses of once backward peoples were suddenly emerging as masters of science and technology? And why take note of "distinguished pedigrees" when most great leaders everywhere were springing from common stock?

One could give good answers to all of these questions. Nonetheless, with everything else there has been a tendency in intellectual and academic circles to regard any stress on inherited human differences as "undemocratic" and "reactionary." This attitude was given special impetus during the period when Lysenkoism was at its height, and the barrage of attacks on "Morgan-Mendelian-capitalist genetics" left enough imprint on many minds to create doubts about the whole science of human genetics—doubts which persist even though Lysenko's theories have long been discredited. An additional bad influence, from quite another direction, was the perversion of genetic theories during the Nazi reign, when the promulgation of fantastic racist doctrines, and the sterilization and extermination orgies for the alleged purpose of "race improvement," increased suspicion regarding the ultimate objectives of both eugenics and human genetics.

But biases against human genetics have by no means arisen solely through outside influences. An important negative factor, I believe, has been the continued disproportionate preoccupation of the science with the pathological and abnormal. This might be explained by a number of facts: That the medical profession had a big head start in studying and recording the hereditary transmission of pathological traits long before there was any science of genetics; that the large majority of active researchers in human genetics are medical men or connected with medical institutions; that most of the research funds have come through medical scurces; and that, for the time being, the most practical and immediate applications of human genetics have been in the field of medicine.

Be that as it may, for the general public human genetics still tends to conjure up gruesome thoughts of idiots and imbeciles, and mentally diseased, physically warped and other abnormal individuals; and in families in whom these occur, it incites fear and shame. Some of this feeling arises from old notions that hereditary afflictions are punishments for ancestral sins, or that excesses and bad habits of various kinds could taint a family's germ plasm. Fears also have been increased by the widespread fallacy that if a condition is hereditary nothing can be done about it, except to stop those affected from having children.

One result is that in the many present fund-raising drives and publicity campaigns in the United States to combat mental diseases and defects, heart ailments, muscular disorders, epilepsy and other conditions, the role of heredity, wherever or to whatever extent it is involved, is generally either ignored or played down as much as possible. On the whole, also, the large popular magazines generally show an aversion to publishing articles about disease inheritance unless some constructive angle is heavily stressed, or unless cures for the condition have been reported (correctly or not). Thus, extensive publicity was given some years ago to the dubious—and presently discredited—claims that feeblemindedness, whatever its cause, could be cured by glutamic acid treatments, or that IQs of idiots could be raised 50 points by special educational methods. Again, in the two most popular movies about mental disease,

"The Snake Pit" and "The Three Faces of Eve," psychoses were made to appear as virtually all due to emotional disturbances in childhood, and fairly easy to cure by sympathetic insights and sessions on an analyst's couch.[2]

It is hardly surprising that the public is most receptive to findings which carry a hopeful note. As the best example, the "Rh" discoveries attracted such widespread favorable attention from both the public and the medical profession (perhaps more than any other genetic finding on record) because they could be applied at once toward saving the lives of thousands of babies yearly. Most recently, new hope for treatment of mental diseases and defects through drugs has made psychiatrists and the public far more sympathetic to theories of inherited biological factors in these conditions. Of special interest here is the attention stirred by findings of a remedial chemical treatment for phenylketonuria—the first instance of success in treating (and possibly preventing) an hereditary mental defect. This has spurred the search for causes and treatments of other mental deficiencies, as well as other "molecular diseases," including sickle-cell anemia. (One project toward this end, directed by Dr. Linus Pauling of the California Institute of Technology, has been aided by a $450,000 grant from the Ford Foundation.) Also giving support to human genetics has been the increasing awareness of how knowledge of inheritance of various diseases (diabetes, for example) can aid in detection and diagnosis of early symptoms in persons with afflicted relatives, and make possible preventive measures.

[2] The sidestepping of possible hereditary or other organic influences in the psychoses is not confined to the popular media. As one example, a psychological journal recently published a paper dealing with schizophrenia in a pair of identical twin adults, and treated this as a rare example of "folié à deux" (i.e., of one individual "catching" the disease from another). There was no mention of the possibility that the concordance might have been genetic, or of the studies by Kallmann and others who have reported scores of such cases.

Many of the biases against human genetics might be lessened or overcome by promoting a clearer understanding of the facts. For example, psychologists who take a strongly anti-hereditarian attitude—and there are many such—often fail to realize that in crediting or blaming environment and early conditioning for almost everything that children are or turn out to be, and not recognizing possible inborn influences, they may be saddling parents and society with an unjust and unsupportable burden of responsibility. And it is precisely within the supposedly most enlightened and sophisticated circles, where environmentalism has had its strongest hold, that parents are driven frantic by guilt feeling when anything goes wrong with a child. (One may question whether any fears or guilt feelings engendered in the past with respect to transmission of hereditary defects were as emotionally traumatic to parents as are the thoughts of what they did or could do to a child by "inadequate love," "rejection," lack of breast feeding, improper toilet training, or what not.) Undoubtedly, a better understanding of the interacting roles of heredity and environment in shaping human lives can help people to recognize more clearly both their potentialities and limitations, and enable parents to rear their children with more wisdom and peace of mind.

Again, among many social scientists there has been antagonism toward bringing out facts about hereditary differences among races or ethnic groups. This, of course, is because such facts have so often been twisted to support race prejudices (as in the case of the early eugenists, later the Nazis, and currently racist agitators in the United States). What might be stressed, then, is that the science of human genetics, far from abetting intolerance, has been one of the most important forces of our time in undermining harmful myths of race. The science has shown that all human beings have a common origin, that there

are no "pure" races, that genes of all kinds and qualities are distributed among all peoples, and that major racial and ethnic differences in behavior and achievement are probably due mainly to environments. All of this, properly interpreted, can hardly offer comfort to those who argue for the innate biological superiority of any one large group of human beings (invariably their own) over others.

Now I should like to come back to my belief that there would be more public interest in and support for human genetics if it were not so heavily slanted toward the pathological and abnormal. I in no sense imply that there should be less activity in medical genetics, or that it should not be pursued to the fullest extent possible. What I do believe is that this research should be supplemented by much more research with respect to "normal" non-pathological traits in which the general public, as well as members of professions other than genetics or medicine, are profoundly interested. For instance, knowledge regarding the inheritance of normal facial details, stature and body form, and pigmentation of hair, eyes and skin, has been advanced little beyond what was brought out almost three decades ago. Such research can help to do much more than answer the question, "What will my baby look like?" Everything added to the knowledge of genetics of easily identifiable human surface traits may prove of immense value in linkage studies, in tagging hidden defective genes, in anthropological research, in revealing genetic effects of atomic radiation, in increasing exclusion chances in doubtful paternity cases, and in various other ways.

There also has been far too little genetic study of normal mental and behavioral differences, and of genius, talents and capacities of many kinds. In the current emphasis on the education of gifted individuals and the training of specialists of many kinds, it would be helpful to know which capacities are governed or influenced by innate factors, and how to identify them at early ages. Similarly, with full awareness of the great influences of environment in delinquency, crime and behavioral aberrations of various types, the possibilities of some genetic predispositions warrant study, and if these are found, the knowledge would aid considerably toward corrective measures.

A particularly challenging area for research is that of genetic differences between human males and females. There is mounting evidence that these differences go much deeper than was previously thought and affect virtually every aspect of human biological make-up and functioning. Thus, exclusive of directly sex-linked traits, there are strong indications of some over-all genetic factors, arising at the cellular level, which cause virtually every major disease to act differently in the two sexes, irrespective of environmental influences, and with the inherent advantages today usually and largely in favor of females. (2) But what are these over-all "sex factors" which are set in motion by the initial XX and XY chromosome differentials? Are they produced in different strengths and degrees, so that one could grade individual males and females accordingly, and estimate their relative chances of susceptibility or resistance to specific ailments and mortality threats? And do these pervasive biochemical factors in any way contribute to sex differences in normal mental functioning, behavior or achievements? The answers could prove important in many ways.

True, it is no easy matter to explore the complex behavioral traits, nor can the conventionally trained human geneticist be expected to carry on such exploration on his own. Much of this behavioral research would require collaboration with other specialists, such as psychiatrists, psychologists, sociologists and anthropologists. In fact, there has been growing realization

among geneticists themselves that the science has passed well beyond the stage where a presumably satisfying study could be made by observing some eccentric type of finger, ear lobe or hair quirk in a student, and getting a Mendelian pedigree of his near relatives. As Dr. Laurence Snyder pointed out a few years ago, "If human genetics is to progress along fresh pathways, the traditional atomistic approach must be supplemented by new methods which will provide information on multifactorial inheritance. . . . The human genetic studies of the future must be cooperative efforts. Only by teamwork involving scientists from many areas can the understanding of the genetics of man be expected to advance appreciably." (3)

The need for more teamwork has also become apparent in the area of genetic counseling. Here, too, there has been increasing awareness of the complexities of the science, and that advice on genetic problems cannot be given as simply and dogmatically as in the old days, and purely on the basis of eugenic considerations. Thus, it was significant that at the Heredity Counseling Symposium conducted by the American Eugenics Society in 1957, the subject was viewed almost entirely from the standpoint of the immediate interests and happiness of the individual parents and their children, and the broader eugenic aspects were almost lost sight of. (4) (In fact, if I am correct, there was only a single reference to eugenics proper and society's interests in not having defective genes propagated, and this only in the form of a question by a discussant.) What was stressed by a number of participants was that genetic counseling must go well beyond the mere estimating and reporting of genetic risks, and into various social, psychological and medical aspects of individual cases. Since few, if any, human geneticists are fully equipped for all this, it was pointed out that effective genetic counseling, like human genetic research itself, might best be a group undertaking in which specialists from a number of other areas would participate.

But this circles us back to the fact that to enlist the cooperation of other scientists requires both a breaking down of biases against human genetics and a stimulation of general interest in the science. Fortunately, there are indications that these favorable developments are under way. Here are some of the reasons for optimism:

1. Medical science, as previously noted, is giving increasing attention to genetic factors in diseases, particularly in the psychoses and in metabolic disorders, and one can look for more and more medical colleges to institute courses in medical genetics. A forecast of this was given at the conference of representatives of about seventy medical colleges, held early in 1958 at the University of Wisconsin, which itself had established a medical-genetics course not long before. (A report on this conference is scheduled to appear shortly in *The American Journal of Human Genetics.*)

2. Psychologists are taking note of the growing attention given by psychiatrists to biochemical factors in mental diseases and emotional disorders, and one can look for active exploration into the possibilities of genetic influences in various functional and behavioral conditions such as speech difficulties, delinquency, sexual aberrations, alcoholism, etc., as well as in "normal" behavior traits.

3. Findings of differential blood-type distributions in racial and ethnic groups have provided anthropologists with some of their most important new research tools, and have greatly stimulated their interest in other aspects of human genetics.

4. Sociologists must inevitably recognize the importance of human genetics in many fields of study, such as of race mixture, population growths and changes, group differentials in diseases and longevity, sexual problems, adoptions, etc.

5. The acute and universal concern about genetic effects of atomic radiation, which will grow with increased use of

atomic energy whether for peacetime purposes or war, is certain to create more demand for the services of human geneticists.

6. The American public is steadily becoming better educated with respect to heredity and how it works. A generation ago relatively few people knew what the words "genes" and "chromosomes" meant, and these terms almost never appeared in newspapers or popular magazines. Today these same terms have become household words, and millions of students have learned or are learning at least something about human genetics in high schools and colleges.

Finally, although we have stressed how great environmental changes have seemingly dwarfed the importance of human genetics, another side to the picture is developing: The same changes, in equalizing environments and greatly reducing the major acquired disparities among human beings, are also making it possible for genetic differences to assert themselves more and to become more significant. The trend in this direction already is apparent in the United States and other advanced countries. We can see this, for example, with respect to diseases. Formerly the environmental afflictions, such as infectious diseases and those resulting from improper or inadequate diet, hygiene and medical care—topped the causes of death and accounted for the greatest differences in morbidity and mortality among human beings (as is still true within backward countries, and in these countries as compared with advanced countries). But as the environmental diseases have been pushed ever farther down in rank, the organic conditions — heart, cancer, kidney, pancreas, glands, etc.—have loomed ever larger in the picture; differences in disease incidences among various socio-economic, racial and ethnic groups have narrowed down; and individual differences in reaction to disease —much influenced by hereditary factors— have assumed greater importance. There is every reason to believe, then, that as environments become further equalized, hereditary differences will play increasingly more prominent roles in the determination of human life expectancies.

Similarly, hereditary differences in mental performances, behavior and personality, largely obscured in highly unequal environments, can be expected to become more apparent, and to demand more attention, as great social changes now in progress go on to reduce the differences among human beings in training, education and opportunities. Thus, one of the major arguments now offered against the validity of intelligence and aptitude tests as measurements of basic capacities is that the results are strongly influenced by conditioned factors. But as both social and academic environments become more uniform for all, performances on these tests will be increasingly indicative of inborn differences. In turn, genetic studies of mental capacities and behavior traits will be far easier to make and will have more meaning than is now the case.

For many reasons, then, one can foresee that the horizons of human genetics are almost certain to become broader, and the prospects for the science as a whole, and for the individual wishing to specialize in it, are bound to become greater. But going with this, the role of the human geneticist, and the training for the profession, will also have to broaden much beyond the present confines of the genetics and medical laboratories. For if human genetics is to go as far as it can and should, it must turn away from any lingering tendencies to view human beings as merely biological specimens. The complexities of human inheritance cannot be studied, nor the knowledge properly applied, without full attention to all the manifold elements in human environments, and an understanding of people's thoughts, feelings, desires and hopes. In sum, to render its greatest service, to

eliminate such biases as may exist against it, to enlist the maximum support of the public and of members of other professions, and to realize its fullest potentialities, human genetics as a science must be made as *human* as possible.

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Vol. XI No. 3 March 1958

CONTENTS

G. Rowntree and N. H. Carrier. The Resort to Divorce in England and Wales, 1858-1957.

C. T. E. Quensel. The Interrelations of Marital Status, Fertility, Family Size and Intelligence Test Scores.

Wolf Scott. Fertility and Social Mobility Among Teachers.

B. Benjamin. Inter-Generation Differences in Occupation.

Book Reviews:

List of Books and Publications Received.

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BIRTH CONTROL IN A RURAL AREA OF PUERTO RICO

WILSON M. WING, M.D., M.P.H.*
MATTHEW TAYBACK, SC.D.†
CLARENCE J. GAMBLE, M.D.‡

FERTILITY-CONTROL services were provided to individual families in a rural area of Puerto Rico, from November 1950 through June 1957, under conditions which permitted quantitative description of the course of the program. This paper provides data suggestive of the order of efficacy of this service and includes interpretive notes which are designed to lead to more effective and desirable programs. The administrative procedures which were the same for the entire area under study will be described. However, results presented will be based only on the experience with families serviced from the health center sub-unit in Barrio X, a district for which it has been possible to study the data more intensively.

By 1949, in Puerto Rico there were over one hundred maternal-health (birth-control) clinics in operation in Health Department facilities throughout the Island. They were recognized as a responsibility of the Department, in the same way that prenatal and postpartum supervision was rendered by the Health Department. Advice and medical examinations were given by the Health Officer to women who requested information on contraception, and supplies were provided without cost to the patient. Supplies in the various clinics were frequently confined to only one method. Patients were required to come to the clinic on an appointed day of the week in order to receive supplies of contraceptive material. If no material for the particular method in use was available, the patient was offered another method if available and either accepted this or was given a future appointment.

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Project Descriptions

Funds for exploration of the possibility of initiating in Puerto Rico a demonstration project of population control through an effective birth-control program were supplied in 1947. After extended discussion it seemed best to set up any such project within the framework of the organized health department so that if positive results were obtained they could possibly have wide application. In addition to an investigation of the types of administrative practice which would be effective in such a program, it was hoped that an answer would be obtained to two questions: (1) what method, or methods, are most acceptable to the rural population of Puerto Rico and (2) where can instruction best be given in a tropical area with low levels of education and economy. It would have been profitable to determine the efficacy of each method, but this appeared impractical within the circumstances of the study. The value of this investigation was predicated upon the assumption that birth-control

procedures of previously demonstrated effectiveness, if used consistently, are more efficacious in controlling fertility than the potentially most efficacious method when used incorrectly, or only occasionally.

The site chosen for the experiment was a municipio with an area of approximately 20 square miles, and located 25 miles from San Juan. The population according to the 1940 census was 11,664, of whom 1,040 lived in the poblacion or urban area. The comparable figures for 1950 were 13,605 and 1,080. The main occupation of the inhabitants is agriculture. Of 4,740 adults, 25 years old and over, 3,517 or 74 per cent completed less than five years of school, and 1,612 or 34 per cent had no schooling at all.[1] In 1949 as part of the Health Center development program of the Island a combined center (preventive, curative and welfare services) was constructed. Two full-time physicians appointed by the Commonwealth Department of Health provide clinical and public health services, and there are 13 beds. Operations such as appendectomies and sterilizations by the Pomeroy method are carried out in the center. Also in 1949 a unit of the health center was set up in Barrio X, a subdivision on the other edge of the municipio from the poblacion and staffed by a public-health nurse. Each week the usual public-health clinics are held in the barrio, doctors and nurses coming over from the poblacion.

The maternal-health clinic in the poblacion started in 1939 had by November 1949 enrolled 372 patients. Within the same time the clinic in Barrio X had enrolled 23. Only 25 of the group at the poblacion and ten of those at the barrio had been seen within three months prior to November 1949. Considering that material given out at a clinic visit was, at most, sufficient for one month's supply, it will be obvious that the effectiveness of the program in controlling unwanted birth could not be judged by the total numbers enrolled.

In December of 1949 the project funds, including support from Young's Rubber Company and Eaton Laboratories, were used to provide salaries for two additional public health nurses in the study area raising the nursing staff from three to five in the area. In addition, a jeep and driver were furnished to make home visits practical outside of the poblacion, and away from the settled area of Barrio X. It was agreed that the two extra nurses should carry out general public-health nursing duties, but their presence made it possible to increase the birth-control clinics in the poblacion from one to two per week and in the barrio weekly instead of bi-weekly clinics became possible.

Clinic Procedures

The Health Department promised to provide at all times adequate supplies of diaphragms, condoms, suppositories and contraceptive creams and jellies to be used as directed either with a diaphragm or injected by syringe. The entering patient was interviewed by the nurse and told that several methods of contraception were available. Trial of diaphragm and jelly, jelly with 5 cc. applicator, suppository or foam tablet was recommended. After the patient was examined by the physician, she was given a month's supply of the material selected.

The patient was instructed to come into the health center or sub-unit at an earlier time, if for any reason, the method was not acceptable. The nurses were authorized to make a change of method on such a visit and to give out supplies of contraceptives to clinic-registered women even outside of regular clinic hours. Since use of the condom for contraception had been the most frequent method throughout the Island, it was felt that sufficient trial had been made and thus the condom was not

[1] U. S. Bureau of the Census: 1950 *Census of Population*, Volume 1, Part 53, page 103.

among the methods offered first. If requested by the patient, such supplies were given freely. The nurses were instructed to give instructions in the rhythm method if a patient had religious objections to mechanical methods, but during the whole time covered by clinic activities there is no record of such a request. Arrangements for sterilization were sometimes facilitated, at the request of the patient, but the method was not recommended as a birth control procedure.

Every woman entering the Health Center for any reason, e.g., prenatal care, delivery, well-baby clinic, immunization, or examination for intestinal parasities was told of the existence of the maternal health clinic, and, if interested, given an appointment. At the time of the six weeks postpartum visit to the home the subject was brought up again.

A canvass was made of all birth-control cases ever known to the clinic. Many of these could be traced. A considerable number, however, made appointments to revisit the clinic and were reactivated. Unfortunately, because of the Health Department policy, the nurse was not permitted to dispense supplies on her home visit, interested patients being required to come for such materials to the Health Center at the time of the maternal-health clinic. New patients were then examined by the physician. This policy proved to be an obvious limiting factor upon the extent of the population which could be reached by birth-control methods.

In November of 1954 it was decided to test the effectiveness of allowing the nurse to give birth-control instruction and supplies to old or new patients in the homes. Project funds were made available for the salary of a nurse and driver and maintenance of a jeep. When visiting in the homes, the nurse was under the direction of a physician of the Asociacion Puertorriquena pro Bienestar de la Familia, a voluntary planned-parenthood organization. During the maternal-health sessions within the health center she acted as one of the regular staff of the Health Department.

Project funds were also used to maintain a full stock of materials for the various methods under study. Thus no patient was required to change a method due to temporary shortage of the normal Health Department supply, nor was she prevented by shortage of supplies from choosing another method.

Visits were made monthly to those easily reached by the jeep and every two months to those more distantly located who received correspondingly larger amounts of supplies. Instructions and supplies were given to neighbors of the users whenever such services were requested.

Differential Utilization of Control Methods

A total of 2,804 months of exposure following registration was subject to recorded observation during the period 1950-1956. During 2,155 or 77 per cent of these months it was possible to determine the specific method of contraception which was used. The extent to which the several birth-control methods were employed by the patients is given in Table 1. Even though the condom was not emphasized in the initial registration procedure, it proved to be the most frequently used method. Thus the condom was the means of protection during 34 per cent of the total person months of recorded contraception. In spite of the fact that diaphragm-and-jelly was consistently urged as a particularly protective form of contraception, it proved less acceptable than the condom and the use of jelly alone, being used in 21 per cent of the contraceptive months.

Effects of Project Fertility

In the determination of the efficacy of a fertility-control project a number of comparisons suggest themselves. The fertility

TABLE 1

MONTHS OF EXPOSURE BY AGE AND METHOD FOR PATIENTS ADMITTED TO MATERNAL HEALTH CLINIC BARRIO X 1950-1956

Age Group	*Total*	*Condom*	*Jelly and Syringe*	*Foam Tablet*	*Suppository*	*Diaphragm and Jelly*	*None*
Total	2,804	733	598	207	170	447	649
Under 20	72	33	14	16	—	—	9
20 - 24	729	98	208	46	54	155	168
25 - 29	954	268	131	65	54	159	278
30 - 34	442	153	114	18	34	41	82
35 - 39	379	117	71	16	29	63	83
40 and Over	228	64	60	46	—	29	29

rates of families before and after registration with the project can be compared. The assumption here is that in the absence of the project the pre-registration rates could be expected to prevail with little change. This thesis implies that for families capable of reproduction there were no new control forces operating other than the fertility-control project. In a rural area, with comparatively little contact with the forces molding attitudes in urban centers, the assumption stated above is of considerable validity. When the pre-registration rates are based upon a period, say, of two years, and the post-registration rates are based on a like period then the marital partners being compared would differ on the average by two years, a factor which per se is not likely to strongly affect fertility rates. However, if the pre-registration fertility rates are based upon all accumulated marital experience and the post-registration rates are based upon from 3-5 years experience, then the families compared differ considerably in mean age. A difference in fertility cannot then be attributed solely to the project but may be, in part, due to the greater age of the post-instruction group.

To avoid confusing age differences in fertility and differences attributed to a fertility-control project, age-specific fertility rates before instruction can be compared with those after instruction. Thus, for example, the fertility rate for women 25-29 years of age, prior to registration, may be compared with the rate noted for women of this age group after registration. Obviously, the calendar years covered by these two experiences may differ considerably and the groups of women being compared are different individuals. This technique removes the effect of age upon the fertility differences observed but assumes that age-specific rates would not change other than through the introduction of the offered control measures. As indicated above, the locale of this study, isolated culturally from urban developments, would appear to be an area in which the assumption is valid.

In Table 2, the pre-registration experience is shown for 222 women who were admitted to the birth-control clinic and who were residents of Barrio X. The index of fertility used is the pregnancy rate, determined as follows:

$$R = \frac{P}{M - (\frac{3}{4}B + \frac{1}{4}A)} \times 100$$

Where R = pregnancy rate (pregnancies per 100 couples per year)

P = Number of pregnancies

M = Years of marital union

B = Full-term live or still births

A = Abortions

Age-specific pregnancy rates for each 5-year-age interval were computed according to this formula, using the number of pregnancies of all patients within each interval and the corresponding number of person-years of exposure. Since many of the women

TABLE 2

AGE-SPECIFIC PREGNANCY RATE PRIOR TO REGISTRATION FOR PATIENTS ADMITTED TO MATERNAL HEALTH CLINIC BARRIO X, 1950-1956

Age of Patient	*Years of Marital Union*	*Full-Term Births*	*Abortions*	*No. of Pregnancies*	*Net Years of exposure*	*Pregnancy Rate*
			Positive History of Contraception			
All ages	653	274	21	295	442	68
Under 20	136	75	2	77	79	97
20 - 24	203	98	8	106	128	83
25 - 29	155	54	5	59	113	52
30 - 34	94	35	1	36	67	54
35 - 44	65	12	5	17	55	31
			No History of Contraception			
All Ages	790	390	26	416	492	85
Under 20	215	115	5	120	128	94
20 - 24	298	154	5	169	174	97
25 - 29	149	68	7	75	96	78
30 - 34	74	22	6	28	56	50
35 - 44	54	21	3	24	38	63
			Total			
All Ages	1,443	664	47	711	934	76
Under 20	351	190	7	197	207	95
20 - 24	501	262	13	275	302	91
25 - 29	304	122	12	134	209	64
30 - 34	168	57	7	64	123	52
35 - 44	119	33	8	41	93	44

at the time of registration gave some history of the use of contraception, observations on the fertility experience of the registered patients are given separately for those who reported previous contraception. It would appear that a history of contraception did not materially affect the fertility experience for women below 25 years of age. This is not to be interpreted as indicating poor results for use of contraceptive methods by these young wives. It is more likely that contraception was started late in marital life, when at least three children had already been conceived and reared past infancy. Although there is some inconsistency in results for women aged 25 years and over, who gave a history of contraception, this group when considered as a whole had a pregnancy rate of 48 per 100 years of exposure as contrasted with a rate of 67 for those with no such history, a reduction in fertility of 28 per cent.

Pregnancy rates computed for the period subsequent to registration were designed to indicate the fertility which could be expected in a population which presumably at the time of instruction desired to reduce unplanned pregnancies to nil. All pregnancies were therefore counted which occurred one or more months following registration except when there was a specific item in the nurse's notes that the pregnancy was planned. In the computation of the person years exposure to pregnancy, the first month following registration was omitted to avoid uncertainty over pre-existing pregnancies. Nine months for each pregnancy, planned or unplanned, and resulting in a full-term delivery was deducted as well as three months for each abortion. Thus intervals during which omissions or irregular use of the contraceptive method here reported remained in the denominator of the pregnancy rate, and when there was a pregnancy it was included in the numerator. This may seem to some critical readers to bias estimates of efficacy of family-planning projects. However, we believe

TABLE 3

AGE-SPECIFIC PREGNANCY RATES AFTER REGISTRATION FOR PATIENTS ADMITTED TO MATERNAL HEALTH CLINIC BARRIO X, 1950-1956

	Method I				Method II*		
Age of Patient (1)	*Years of Exposure* (2)	*Total Pregnancies* (3)	*Planned Pregnancies* (4)	*Unplanned Pregnancies* (5)	*Unplanned Pregnancy Rate* (6)	*Years of Exposure* (7)	*Unplanned Pregnancies* (8)	*Unplanned Pregnancy Rate* (9)
All Ages	233.7	98	13	85	36	179.6	58	32
Under 20	6.0	5	2	3	50	5.2	1	19
20 - 24	60.8	32	5	27	44	46.8	17	36
25 - 29	79.5	40	3	37	47	56.3	30	53
30 - 34	36.8	13	3	10	27	30.0	6	20
35 and Over	50.6	8	0	8	16	41.3	4	10

* Excludes years of exposure in connection with non-use of supplies.

that this procedure is the only valid basis for determining pregnancy rates which a program director may expect for those mothers who register with a service of the type described earlier in this paper.

The post-registration experience covered a total of 234 couple-years of exposure to contraception. During this time 98 pregnancies occurred of which 13 were planned. In Table 3, age-specific unplanned pregnancy rates are shown, based upon post-registration experience. These indices appear in column 6, (Method I) and vary from a ratio of 50 pregnancies per 100 persons years of exposure for women under 20 years of age to 16 for women 35 years and older.*

The efficacy of the project may be evaluated by (1) determining age-specific unplanned pregnancy rates following registration (R_b), (2) comparing these indices with rates which were noted among women not practicing contraception prior to registration (R_a) and (3) determining a ratio

$$E = \text{Efficacy Ratio} = \left(1 - \frac{R_b}{R_a}\right) \times 100$$

which expresses the percentage reduction in fertility attributable to the family-planning service. Estimates of efficacy using this method are given in Table 4. For all age groups, except 35 years of age and over, the unplanned pregnancy rate is between 40 to 50 per cent of the level of fertility noted prior to registration. The efficacy ratio reaches a maximum of 75 per cent in the oldest age levels. (It should be understood that the corresponding reduction in birth rates will be somewhat less than that stated in connection with pregnancy rates.)

An unplanned pregnancy among women registered in a fertility-control service must be regarded as a failure of the program. The field staff were instructed to query carefully the mother involved to determine, if possible, the reasons for contraceptive failure in connection with the 85 unplanned pregnancies. Fifteen of these were attributed by respondents to failure of method. Of the remaining 70 failures, 20, or 29 per cent, were attributed to non-cooperation of the husband, 21, or 30 per cent, occurred as a result of occasional failure to use the available method, 7, or 10

* During the 234 elapsed couple-years there were 55 years in which contraception was not used. Reasons such as non-cooperation of the husband, exhaustion of supplies, pregnancy or lack of interest were given. From one point of view each pregnancy occurring during such times constitutes a failure of the method and of the project. It is, however, of interest to calculate the pregnancy rate for periods in which systematic use of a contraceptive method was reported. These are given in column 9, and will be useful for comparison with reports of other projects in which this form of calculation is frequently employed.

TABLE 4

AGE-SPECIFIC ESTIMATES OF EFFICACY FOR MATERNAL HEALTH CLINIC SERVICES BARRIO X, 1950-1956

Age of Parent	*Rate of Pregnancy (Non Contraceptive Experience)* (R_a)	*Rate of Unplanned Pregnancy (Contraceptive Experience)* (R_b)	*Efficacy Rate* $(1 - \frac{R_b}{R_a}) \times 100$
All Ages	85	42[1]	49
Under 20	94	50	47
20 - 24	97	44	54
25 - 29	78	47	40
30 - 34	50	27	46
35 and Over	63	16	75

[1] Based on application of age-specific unplanned pregnancy rates to the same age distribution used in connection with the computation of R_a quantities (See Table 1).

per cent, were due to failure to use contraception because of fear of pain, and 6 or 9 per cent were ascribed to incorrect use of the method. No useful information could be secured on the cause of the remaining 16 failures.

Efficacy of Individual Methods

In order to determine validly whether the separate methods differed in effectiveness, a therapeutic trial would have been necessary. Briefly stated, this would have required a random distribution of methods among the registrants and considerable rigidity so far as permission to change methods was concerned. Because freedom of choice was considered necessary to secure maximum cooperation, a test of this type was not attempted. In an analysis of unplanned pregnancy rates by method, the condom, suppository and foam tablet appeared to be of the same general order of effectiveness while the diaphragm and jelly, and jelly-alone techniques produced pregnancy rates 20 per cent above those recorded for the first group of three methods. Since a satisfactory design for comparative analysis was lacking, and the total experience was limited, these impressions should be regarded as merely suggestive of what may be expected with rural type populations.

Interpretation and Summary

A universally acceptable means for fertility control is not known at the present time. Motivation, religion, the availability of supplies are several of the more important factors which determine whether or not the principle of fertility control will be accepted as well as the method to be used. In a rural situation in Puerto Rico, it would appear that the condom is the most acceptable of the presently available techniques.

An unplanned pregnancy constitutes a failure of any plan for birth control. The failure may be due to deficiencies in the materials used. It may be due to improper use of the method. It may come about as a result of irregular use of the method, instances of omission being ascribed to pain, lack of cooperation from husband, etc. Based on 2,804 months of recorded experience, the unplanned pregnancy rate was found to be 42 pregnancies per 100 couples per year, a drop of 49 per cent from the rate which presumably would have been obtained in the absence of the use of contraceptive methods. Half of the failures were attributed to husband noncooperation and to irregular use of available methods. This would seem to suggest that the clinic and home visiting program should provide some means for enlisting the husband's interest and cooperation toward a satisfactory plan for birth control.

A program of birth control in a rural population must provide a convenient

means of bringing basic knowledge and necessary supplies to the patient in her home. Restriction of these services to the limits of a clinic setting results in failures attributable to patient difficulties in transportation, and does not provide the encouragement and support which many isolated families require to effectively and consistently use the selected method of contraception.

Acknowledgement is made of the counsel in study design received from Mr. Jose Janer, Director, Bureau of Statistics of the Puerto Rican Department of Health. The vigorous efforts of Dr. Edris Rice-Wray, formerly medical consultant to the Asociacion Puertorriquena pro Bienester de la Familia, were most helpful in assuring a consistent control effort under difficult conditions.

ANNALS OF
HUMAN GENETICS
VOL. 22, NO. 4 AUGUST, 1958
CONTENTS

LYNAS, Margaret A. Marfan's syndrome in Northern Ireland. An account of 13 families.
LYNAS, Margaret A. and MERRETT, J. D. Data on linkage in man. Marfan's syndrome in Northern Ireland.
DAWSON, G. W. P. The blood group frequencies in some occupational groups in County Dublin.
HOLT, Sarah B. Genetics of dermal ridges: the relation between total ridge-count and the variability of counts from finger to finger.
BULMER, M. G. A note on monozygotic twin diagnosis.
LAWLER, Sylvia D., RENWICK, J. H., HAUGE, M., MOSBECH, J. and WILDER-VANCK, L. S. Linkage tests involving the P blood group locus and further data on the ABO:nail-patella linkage.
SIMPSON, H. Estimation of linkage on an electronic computer.
MILLIS, Jean. The influence of maternal age and birth order on the outcome of pregnancy in poor Chinese women.
BERG, J. M. and STERN, J. Iris colour in phenylketonuria.
ARCHER, H. E., DARMER, A. E., SCOWEN, E. F. and WATTS, R. W. E. Observations on the possible genetic basis of hyperoxaluria.
SALDANHA, P. H. Taste thresholds for phenylthiourea in a sample of Japanese.
KARN, Mary N. Considerations arising from weight and some other variables recorded in the Survey of Women's Measurements (1957).

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Marriage and Family Living

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Editorial Board: Harold T. Christensen, Editor; James H. S. Bossard; Meyer F. Nimkoff; John Spiegel.

"Governmental Services Affecting American Families" is the theme for the August, 1958, issue of *Marriage and Family Living* under the special guest editorship of Dr. Hugh Carter, Chief of Marriage and Divorce Analysis of the National Office of Vital Statistics, Department of Health, Education and Welfare. This issue will feature articles by outstanding authors describing the programs, contributions, and services of various federal agencies which deal with the family including:

Social Service, The Veterans Administration, and the Family, Roger Cumming, Veterans Administration

The Contribution of Public Assistance to Family Life in the United States, Helen E. Martz, Social Security Administration

Activities of the National Institute of Mental Health Which Affect American Families, Harold P. Halpert, National Institute of Mental Health.

In addition to other articles, there are book reviews and a selected list of publications related to the subject of this August, 1958, Special Issue.

Since an impressive array of materials not otherwise readily available will be contained in this issue, students and other interested persons may order single copies for $1.50 from the National Council on Family Relations, 1219 University Avenue, S.E., Minneapolis 14, Minnesota.

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FACTORS OPERATIVE IN MATE SELECTION IN A PHILIPPINE VILLAGE*

ETHEL NURGE
Goucher College

A NUMBER OF STUDIES have been made in various sectors of American society about the relationship between cultural factors and mate selection. Many of these have been made to test the relationship between propinquity and mate selection.[1] The present study deals not so much with propinquity in finely measured degrees, nor yet with race, ethnic origin, or religion, but rather with proximity in terms of comparatively gross physical space and with a number of cultural factors which are not necessarily brought to the fore in studies of American society. This paper has relevance to eugenics and demography in that it demonstrates, for one area at least, the difficulties involved in the break-up of "isolates" or inbred communities.

It is not necessary to consider the ramifications of race, racial identity, and racial identification because the social unit on which we are to focus is composed of one group, Filipinos, who consider themselves one race. We will not be called upon to deal with ethnic origin for, although there are many ethnic groups in the Philippines, the village we are concerned with has a high degree of ethnic homogeneity. They are all Christian Filipinos. Language will not be one of our considerations because the dialect spoken by all is Wary Wary. It will not be part of our study to isolate the variable, religion, because almost all of the people are nominally Catholics and have been so for hundreds of years. These factors, then — religion, ethnic origin, language, and race—are for all practical purposes, held constant. What is not? Some of the cultural variables operative in the selection of any given spouse in this village are socio-economic status and opportunity for contact between the marriageable youths. The prescriptions about courtship as well as those about the regulation of

* Paper in a shortened form was read at the annual meeting of the American Anthropological Association in Chicago, December, 1957. The field work was made possible by the support of the Fulbright Foundation whose financial and moral support is gratefully acknowledged.

[1] Davie, M. R. and Reeves, R. J., "Propinquity of Residence Before Marriage," *American Journal of Sociology*, XLIV, (January, 1939); Bossard, J. H. S., "Residential Propinquity as a Factor in Marriage Selection," *American Journal of Sociology*, XXXVIII, (September, 1932) and Abrams, R. H., "Residential Propinquity as a Factor in Marriage Selection: Fifty Year Trends in Philadelphia," *American Sociological Review*, VIII, (June, 1943); Clarke, A. C., "An Examination of the Operation of Residential Propinquity as a Factor in Mate Selection," *American Sociological Review*, XVII, (February, 1952). Other relevant studies are: Hollingshead, A. B., "Cultural Factors in the Selection of Marriage Mates," *American Sociological Review*, XVI, (October, 1950); Burgess, E. W. and Wallin, P., "Homogamy in Social Characteristics," *American Journal of Sociology*, XLIX, (1943); Smith M., "Similarities in Marriage Partners in Intelligence," *American Sociological Review*, VI (October, 1941) and Smith, M., "A Research Note on Homogamy of Marriage Partners in Selected Physical Characteristics," *American Sociological Review*, XI, (April, 1946).

sanctioned union are fairly standardized for all members of the village although the norms are in a slow process of change as we shall see.

The Village

Guinhangdan is a small agricultural-fishing village located on the national road in northeastern Leyte, Republic of the Philippines. The climate is tropical, and there are no seasons other than wet and dry. Ocean and river fish are supplementary to rice as the staples in an undiversified diet. Houses are of bamboo and thatch and are raised off the black, sandy soil to stand perched in rather irregular rows. The buses which travel along the national road are now as familiar a feature of transportation to the natives as are their well-known outrigger canoes. Twelve hundred people in more than 200 households live a quiet, peaceful life in Guinhangdan. The rhythm of their lives is quickened by market days, visitors, and the celebration or observation of life crisis rites and religious ceremonials — processions and fiestas being important in the latter instance.

The Courtship Customs

Courtship customs are an appropriate area in which to begin. Courtship is a semi-secret affair. Defined occasions for meeting a love object include fiesta, feasts, or dances. After a good deal of hesitation, which is offset by encouragement of peers, a boy will dance with a girl and try to win her favor. The girls act very shy, quiet, and circumspect at this stage, and they do not flirt. After the initial meeting, some time is allowed to lapse and then the male may take up the next stage of courtship and send messages, notes, or letters to the girl. She, again, is coy and initially unresponsive, not answering the missiles until several have been sent. This part of courtship is handled with titillative secrecy. Special messengers are employed and circuitous routes are used to keep the communication secret from the parents. If the girl encourages the boy, the next step in courtship is undertaken. This consists of several serenades. The boy asks a few of his male friends to accompany him, and the group, usually a trio, make their way to the home of the girl rather late of an evening. One of the boys carries a guitar, the only instrument pressed into service at this time. Standing outside of the domicile at a respectful distance from the house, they sing both popular songs from the numerous movies now filmed in the Philippines in which Tagalog is the *lingua franca* and folk songs which are primarily in Wary Wary. It is not incumbent upon the girl to make any acknowledgement; in fact it would be forward if she came to the window or door. She is permitted to peek through the cracks in the thatched wall, however. If her parents are well disposed to the lad, which means in this society that they are friendly with his parents, they may bid him and his companions enter the house and conversation, but no feeding, will ensue. If the parents do not like the boy, they will ignore the music; there will be no invitation to enter the domicile; the family members will mutter among themselves but there will be no overt act of rejection or aggression.

We have mentioned the approved and customary occasions for meeting a love object and outlined the courtship procedures. A few words, now, about what constitutes an ideal love object, both male and female, are in order. Desirable females, both from the viewpoint of elders and the suitor, have families with money and/or possessions, or they have educated members or steady jobs, usually in the government service. Desirable females are soft-spoken and peaceful but not necessarily either virgin or chaste. Beauty is desirable and is defined primarily in terms of lightness of color and height and secondarily in terms of facial features, special attention

being given to complexion. Breasts, legs, and buttocks are not erotically important. Desirable males are members of monied families, of families having much land or political or social eminence. Furthermore, desirable males are even-tempered and amenable to suggestion. Handsomeness is defined in terms of height and skin color and secondarily in terms of facial features. Biceps, chest development, hip contours and legs are not of erotic importance. It is the expectation of all that both boy and girl will be respectful and obedient to all who are older than they are and that they will be mutually respectful and obedient to each other.

Marriage Arrangements

How, by whom, and under what circumstances are permanent, sanctioned, marital unions arranged? For several decades marriage in Guinhangdan has been undergoing slow gradual change. Formerly parents chose the mate of a boy or girl although the young people frequently had a degree of choice, or some veto power. A series of two meetings with attendant feasting and oratory were part of the marriage arrangements. The male underwent a period of probationary labor, and the girl was under scrutiny for her performance of the female role. For analytic purposes, the important element was that control of mate selection lay primarily with the parents. Today this is not true. Instead all formal marriage rites follow some weeks or months after an elopement by a young couple. In other words, the youngsters have taken away from their elders one of the kinds of control in mate selection. The passing of this control into the hands of the young ones is only partial, of course. For instance, if the parents are firmly set against a permanent union, marriage will not follow the elopement even if the girl gets pregnant. It is felt by young and old that the parent's permission is necessary. In most instances, parents give permission, if not approval, after a period of sulking and "cooling off." In no instance, when the parents actively disapproved the union, did the couple maintain the alliance.[2]

Marriages tend to be within social classes, and there are practical reasons for this. Affinal relatives have almost as much right to one's largess as do one's consanguineous kin. There are finely graded differences for the various dyadic relationships, but, on the whole, affinal kin are kin to whom one has broad obligations. So that, even in these days of greater personal choice through the mechanism of elopement, mates tend to choose each other with consideration of the family group as a whole and individuals keep in mind any advantage to be lost through a poor marriage. Furthermore, after the elopement there is an arranged meeting or two between both sets of parents and, at this meeting, the boy's side (as in the old pattern) bring food, workers, and influential orators to the meeting. There is a feeling that these must be of a caliber pleasing and fitting to the girl's family. Accordingly a poor boy cannot aspire very much above the economic level which his parents have. The bride-price exists, and in marriage arrangements the family of the male must bargain with the family of the female and the two families must come to an agreement on property exchange. In this respect the old practices continue, although some of the items which form part of the bride-price have changed form. Thus while *betel* nut was important formerly, the more common stimulant is now tobacco. *Tuba*, a coconut palm wine, was and continues to be, an important item of the marriage arrangements.

[2] It is interesting to note that when informants are questioned about marriage arrangements they invariably answer with a long account of the old-style contract. They do not see that elopement is the current marriage arrangement. When arrangements for marriages made in the last ten years were reviewed, it was found that only one was contracted under the old marriage arrangement system.

The Marrying Population and Geographical Factors

We will now consider the degree to which endogamy (marriage within a given social unit; in this instance, the social unit is the village) is present in the village. We will do this by a consideration of the birthplace of spouses and their residence at time of courtship. Of the 231 households, 196 had a nucleus of a married couple. The remaining household heads were four unmarried females, two unmarried males, twenty-two widows, six widowers, and one male separated from his wife. From the counts that follow we have eliminated the unmarried males, the unmarried females, the widows and widowers and the family broken by separation. We will consider only the 196 couples, dyads in which both persons are still living and are still living together. For these 392 people, place of birth and residence at time of courtship were ascertained. The numbers are as follows:

TABLE 1

BIRTHPLACE OF 392 SPOUSES

	Males	*Females*
Guinhangdan	141	118
Palo and municipality	21	30
Tanauan and municipality	6	8
Tacloban and municipality	4	4
Samar	4	13
Elsewhere	20	23
	196	196

TABLE 2

RESIDENCE AT TIME OF COURTSHIP

	Males	*Females*
Guinhangdan	151	141
Palo and municipality	12	23
Tacloban and municipality	8	7
Tanauan and municipality	3	2
Samar	5	5
Elsewhere	17	18
	196	196

If the places mentioned in the tables are traced on a map, the geographical distribution of the mates is found to be remarkably circumscribed. The homes in the village proper are clustered in an area of roughly one kilometer north and south and about half a kilometer east and west. The town of Palo is but two kilometers to the north although the municipality proper, the political demarcation, is, of course, a larger unit covering a few square kilometers. Tanauan is a market town to the south about three kilometers, and Tacloban is the island capital and is 17 kilometers to the north. Samar is the island to the east of Leyte and is reached only by an overnight trip in an outrigger canoe. Since World War II it is possible to visit Samar by traveling on public transportation facilities. The trip includes the use of buses on both islands and a ferry jaunt between the islands, the ferry being an old U.S. Army LST landing craft.

If we compare birth patterns with residence patterns, the correlates are these:

TABLE 3

CORRELATES OF BIRTH AND RESIDENCE OF 392 SPOUSES

	Males	*Females*
Born and residing in Guinhangdan when courting	122	114
Born in Guinhangdan but residing elsewhere when courting	19	5
Born elsewhere but residing in Guinhangdan when courting	29	27
Neither born in nor residing in Guinhangdan when courting	26	50
	196	196

Residence Patterns

The question arises as to why the twenty-six husbands and fifty wives moved into Guinhangdon when neither he nor she was born there nor residing there at time of courtship. This was determined by questioning them, and in many of the cases, of course, one of the spouses lived or was born in the village and the other came in at marriage. However, there were some cases where the newlyweds came to the village to join a relative other than the parents of either. Residence at the time of marriage is not simply matrilocal or patrilocal, and it is definitely not neolocal. Normally the young couple join an estab-

lished household for the first few years of married life, but the factors which decide whose household that shall be are not the degree of closeness of the relative nor yet whether the connection is in the male or female line. What seems to be operative here are two factors: the need of one of the sets of parents (and/or other degree relative) for the labor and/or financial aid of the young couple and, secondly, a strong personal need on the part of a parent or set of parents (or other degree relative) for the presence of his or her child. In the latter instance, the possessive parent must have the manipulative power to persuade or coerce the couple to take up residence with him or her. Eventually, the length of time depending in part on individual need for autonomy, the young couple will beg, borrow, or raise the materials and the money to build their own house. Normally by this time they have a child or two.

There were eight cases where neither the husband nor the wife were born in or resident in Guinhangdan at the time of courtship. Their subsequent settling in the village was due to these reasons: in three cases a parent of either lived in Guinhangdan even though this particular child had not been born there nor was resident there at time of courtship; in one case the couple joined the wife's paternal uncle; in two cases the young-marrieds came to the village because the husband hoped to better himself economically through fishing; one couple came because the school is conveniently located; and one couple came because the man had been ill and had made a vow to the village patron saint that he would come to live in the village should he regain his health.

Discussion

It is a matter of fairly general assumption that the more widely traveled a youth is and the more contacts and acquaintances he or she will make, the wider is the circle of prospective mates.[3] Perhaps this is true in America, but even here the validity of the assumption remains to be proved. There are so many social factors affecting selection that a mere increase in numbers of potential spouses is of relatively minor importance. Today the youth of Guinhangdan have many more opportunities than formerly to meet marriageable youths other than their village relatives and friends. For instance, the village is built on the national road and buses have become a familiar part of the pattern of life. The Bureau of Motor Vehicles in Tacloban lists seventeen entrepreneurs who run buses which pass through Guinhangdan. The number of buses owned by each individual or company ranges from one to nine. In a single day as many as 120 buses might pass through the village. Not only do the buses pass through the village, but also they are heavily traveled. Normally they are crowded to an unbelievable degree, with livestock and produce being an accepted part of the load, and the villagers are eternally traveling somewhere. Visiting is a most popular pastime, and, yet, the marrying population remains surprisingly restricted.

Another fact which attests to the amount of traveling the villagers do, and consequently the increase in the number of people they meet, is the fact that a fair number of children these days go out to school. The village school is a six-grade school which corresponds to our elementary school; high school begins in the seventh year. The proportion of the children of the total number who do go to high school is small; yet all of them who attend, do so by going out to Tacloban, the provincial capital. They may go up every day and come back in the evening, or they may

[3] Carpenter, Niles, "Courtship Practices and Contemporary Social Change in America," in *The Annals* of the American Academy of Political and Social Sciences, 1932.

board or live with relatives in the city. The numbers who go on to college are even smaller, but they may go even farther afield. The best colleges are not on Leyte; one is in Manila and one is on Cebu. To be sure, the college in Tacloban gets the greater number of village youth whose families are affluent enough to send them to college, but in any event the pursuit of higher education is leading many children and youths outside of the village.

Questioning about why people traveled elicited the following information. Taxes are paid in Palo because Guinhangdan is a village under Palo's jurisdiction. This does not mean many trips because so few people pay taxes and they are paid so seldom. People generally travel to Palo to market and this is a daily occurrence for some, a rare trip for the very poor, and an event of every few days occurrence for most. There are two other general shopping areas: Tanauan and Tacloban. Not many people go to Tanauan, but Tacloban is popular particularly when shopping for something out of the ordinary. Tacloban has a great diversity of foodstuffs and materials and the shops and bazaars are open every day. Tanauan's market day is Sunday, and Palo has a big market day on Wednesday and a considerably smaller collection of food offerings every day. Cockfighting is an attraction that draws many males, and cock fights are held on Sunday in Tanauan and on Saturday in Tacloban. Perhaps 25 kilometers to the south of the village is another municipal capital, Dulag, but almost nobody from the village goes there and only the most urgent of business or family reasons would result in their venturing so far.

Guinhangdan is a coastal village. What amount of travel is there from this village to interior villages, hamlets, and individual farms? Within the municipality of Palo there is a good deal of travel because many villagers or their relatives own land in the area. However, nobody owns land any farther south than Kabarasan Daku or farther west than Castilla or St. Augustine. The western boundary points do not even reach to the mountains which form a backbone ridge to the island. Travel to interior villages, hamlets, or farms also occurs at times of fiestas, weddings, baptisms, funerals, or memorial rites. There is, then, much evidence that the amount of travel is considerable. However, travel does not necessarily mean that the travelers can, will, and do communicate in any meaningful intimate way with the outsiders that they meet. The ignorant tourist who sees much and understands little is a case in point. Redfield has observed in Guatemala that the Indians are frequently travelers but that, nonetheless, they remain fairly isolated in their separate villages, each village having customs peculiar to itself and the members of each village being so physically inbred that they resemble each other markedly.[4] In Guinhangdan the people are aware of their like-mindedness within the village and of the (what looks to us like) slightly different customs in other villages. As such they philosophize: "It is better to marry within one's own village; here we know what to expect." In addition to their like-mindedness, they have an active suspicion and distrust of non-village people and even of places outside the village. It is always the next village which has the most witches. The farther the village from home base, the more malevolent the supernaturals may become. Thus while there were no *barongs* (a type of sorcerer who caused deformation of the facial features, particularly the nose) in Guinhangdan, there were many of them on Samar. When after having lived in Guinhangdan for two months and having established some identification of self with group, the investigator went on a journey to Samar, real concern was expressed for her safety among such powerful and malevolent beings as inhabited that island.

The complexity of cultural factors in

[4] Redfield, R., "The Folk Society," *American Journal of Sociology*, Jan., 1947, pp. 293-308.

mate selection has been explored with special reference to courtship procedures, socio-economic status, residence customs, and the patterns of traveling. Despite an increase in the number of opportunities and reason for travel and in the number of individuals traveling, the marrying population remains remarkably circumscribed. Some of the culturally functional reasons for this situation have been presented.

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BOOK REVIEWS

EFFECT OF RADIATION ON HUMAN HEREDITY: World Health Organization. Geneva, 1957. pp. 168. £1, $4.00, Su. fr. 12.

This is the third publication on the effects of ionizing radiation in man to appear in the last two years, sponsored by a national or international organization. The first two, the reports by the National Academy of Sciences of the United States and the Medical Research Council of Great Britain, appeared in 1956. These two reports were addressed primarily to the public, were written in simple language, presented a clear exposition of the problem and its implications, and tried to set quantitative limits to potential radiation risks. They were the main source of dependable information for the layman who was thoroughly confused by the journalistic and political mistreatment of the subject.

The World Health Organization invited a group of experts to meet in Copenhagen in August, 1956 and to report on the effects of radiation on human heredity. WHO's purpose in convening the Study Group, as set forth in the preface to the report, was "to obtain the opinion of authorities on genetics from countries other than those whose national committees have already stated their views . . . and to hear opinions of a number of experts on an aspect relatively lightly touched upon in the national reports—namely, the lines of research which should be followed, in the light of present knowledge, to increase our understanding of the genetic effects of ionizing radiation on man."

The report of the Study Group is clearly not intended for the layman but is addressed primarily to the educator and the specialist.

The report is divided into two parts: Part I, the report proper, which is brief and contains the recommendations and conclusions of the Study Group; and the more extensive Part II which is made up of the papers presented at the Study Group.

In Part I, after asserting that "Man's most precious trust is his genetic heritage upon which must depend the health and orderly development of future generations," the Study Group proceeds to make extensive recommendations for future research in areas in which wide gaps in our knowledge still exist. The need for the establishment of more human and general genetics departments, for training of more geneticists and for giving instruction in genetics to all scientists is particularly stressed. This reviewer was very pleased to see recommended that genetic diseases be studied with particular reference to their epidemiology, and that genetic registries be established with the assistance of a United Nations Agency.

The papers in Part II cover an impressive list of topics which may be summarized as follows: Point mutations (H. J. Muller); theoretical considerations on the effects of induced mutations on mendelian populations (T. C. Carter, B. Wallace); dosage from background and therapeutic radiation (R. M. Sievert, W. M. Court Brown); methods for detecting induced mutations (J. Lejeune); estimation of mutation rates in man (L. S. Penrose, A. C. Stevenson, J. V. Neel); studies of populations of special genetic interest (A. R. Gopal-Ayengar, N. Freire-Maia); and, establishment of genetic registries (H. B. Newcombe).

The papers are all of the highest caliber. Although no attempt at a synthesis is made, the Study Group has been particularly successful in its second objective, namely, to make recommendations concerning the lines of research to be followed. These are sound recommendations which can be carried out. Let us hope that the Government Agencies concerned and our educators will not turn a deaf ear.

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IL PROBLEMA DELL' EREDITA NELLE MALATTIE REUMATICHE (The problem of heredity in rheumatic dsieases) by U. Teodori and G. G. Neri Serneri. X Congresso dela Soc. Ital. di Reumat. Supl. 1. *Reumatismo,* 1957.

The authors have done an admirable job on a very complicated phase of medical genetics. Their first task was to clearly define their cases upon which the genetic analysis was based. The authors have selected Lunedei's classification of rheumatic diseases which is based on the tissues involved. The details of this classification have been described elsewhere. In general, this classification includes two major groups of rheumatic diseases, those which the authors prefer to call diseases of the "first order" and those of the "second order." Those of the first order include primary acute rheumatism, RAP, (Rheumatic Fever), and primary chronic rheumatism, RCP, (Rheumatoid Arthritis). Those of the second order include the others such as ankylosing spondylitis and gout.

The major theme of this work is concerned mainly with the genetic analysis of RAP and RCP, and the possible genetic connection between the two. The general conclusion derived by these two workers is that the predisposition to RAP is due to an autosomal dominant with a penetrance of approximately 70 per cent, while the predisposition to RCP is also due to an autosomal dominant with a 60 per cent penetrance, sex influenced to a certain degree, being predominant among females. Further analysis has indicated that predisposition to these two diseases has a common dominant gene, it being conditioned by other modifying genes, which in turn determine more RAP and fewer RCP in some families and vice versa.

The authors also have attempted to establish a genetic correlation between the rheumatic diseases of the first order and ankylosing spondylitis but without success because of insufficient evidence.

Other clinically manifested forms of arthritis (painful) has been found to be due to a dominant factor with a penetrance of 65 per cent. No single genetic factor was found common to this form of arthritis and the rheumatic diseases of the first order (RAP and RCP).

In the opinion of this reviewer these two authors have made an excellent attempt to unify the work in this field by critically reviewing the work of others in the light of their own data. The authors could have been more complete in their statistical treatment in certain sections of the work by giving significance tests and calculating dispersion measures.

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PROBLEMI DI GENETICA MEDICA IN CAMPO ENDOCRINOLOGICE (Problems of Medical Genetics in the Field of Endocrinology). U. Teodori con la collaborazione di U. Bigozzi, A. Borghi, G. Giusti, F. Morabito, G. G. Neri-Serneri: 1957. VII Congresso Nazionale della Societa Italiana di Endocrinologia.

The authors give a thorough review of the newer facts known on hereditary occur-

rence of endocrine disorders. The impressive amount of related reports from the world literature compiled here will make the book valuable for any worker in this field. After a general introduction and a chapter on the fetal development of the endocrine glands, the following anomalies and diseases are discussed in detail: disorders of the gonads and sexual differentiation with special emphasis on all forms and degrees of intersexuality, disorders of suprarenal function, gigantism and dwarfism, goiter and under- and overfunction of the thyroid gland, disorders of the hypothalamic brain centers, essential (constitutional) obesity, and over- and under-function of the parathyroid glands. It is demonstrated that genetic factors appear to play a role in the etiology of almost all the disorders discussed. Essential obesity is treated extensively although it is admittedly not an endocrine disorder. Likewise, the chapters on gigantism and dwarfism deal with a number of anomalies which have nothing to do with the ductless glands. Diabetes mellitus is treated only briefly, and several endocrine disorders are not mentioned at all, among them certain pituitary diseases and the rare but genetically instructive cases of benign, hormone-producing tumors (adenomas) of multiple endocrine glands.

The book is written with mastery of the clinics and with subtle comprehension of pathogenetic problems and causal connexions. The authors' genetic conclusions, however, are sometimes open to criticism. Wherever, e.g. a hereditary syndrome of two or more concurring abnormal traits displays a wide intrafamilial variance so that just one or few individuals present the full syndrome while other family members are affected only by various of the partial pathologic traits, the authors consider a single pleiotropic gene responsible for the entire syndrome in question. This interpretation seems very improbable and is not supported by any analogy in experimental genetics. Throughout the book the great importance of the knowledge of genetic facts for the correct understanding of pathogenesis and clinics in endocrinology is emphasized. A number of pedigrees and tables complete the book.

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NATURAL SELECTION IN MAN: Arranged by J. N. Spuhler, Wayne University Press, Detroit, 1958, 72 pp.

"Natural Selection in Man," arranged by J. N. Spuhler, is a compilation of the papers read at a Supper Conference sponsored by the Wenner-Gren Foundation for Anthropological Research which was held on April 12, 1957 in conjunction with the joint meeting of the American Society of Human Genetics and the American Association of Physical Anthropologists.

Dr. J. F. Crow discussed quantitative methods for the measurement of selection intensity in man. There are three levels of selection intensity: 1) total—the total extent to which individuals of one generation are differentially represented in succeeding generations; (2) phenotypic—the extent to which this differential is associated with phenotype (i.e., not due to random or environmental effects on survival and reproduction); and (3) genetic—the extent to which genetic characteristics make differential contributions to succeeding generations. He derived an expression for the index of total selection and, by the use of United States census data, it was shown that between 1910 and 1950 the total selection intensity has decreased, while the selection due to differences in fertility has actually increased.

The genetic load of a population is defined as "the extent to which it is impaired by the fact that not all individuals in the populations are of the optimum type." The genetic load may be divided into three components: the *mutation load* is imposed by recurrent harmful mutations; the *segregation load* is associated with balanced poly-

morphisms where the heteorzygote is favored over homozygotes and the relatively harmful homozygotes are maintained in the population; the *incompatability load* is due to parent-child imcompatability of the type discussed later by Levine.

Dr. P. Levine presented evidence that parental ABO blood factors may protect infants against Rh-erythroblastosis. Women who are Rh-negative do not seem to develop antibodies against cells of Rh-positive fetuses if the latter cells are of an ABO group incompatible with the mother's serum. This would help to explain why Rh-negative women do not more often have erythroblastotic babies. It is a fascinating account of interactions at the phenotypic level.

Dr. C. S. Coon has given an account of his recent "Anthropogeographic" excursion around the world. He points out that many primitive populations are still only poorly studied. These represent opportunities for the investigation of populations with different selection pressures than those present in sophisticated communities. Dr. J. V. Neel discusses three approaches which can be used in a study of natural selection in humans. There is a striking difference in fertility rates in women in a given population. Thus, in New South Wales, Australia, at the turn of the century, 50 per cent of the females gave birth to 76.4 per cent of the children, and in the United States in 1940, 50 per cent of the females were responsible for nearly 90 per cent of the children born in each generation. The corresponding rates for primitive societies are generally somewhat lower. Although much of this difference is sociological and economic, some is probably related to genetic factors and represents an attractive area for study. Increases in the standard of living bring with them additional hazards to longevity. Neel considers the importance of high animal fat diet and high salt intake as factors which selectively affect genetically susceptible people by producing atherosclerosis and hypertension. He concludes with a discussion of the polymorphic system, adult hemoglobin-sickle cell hemoglobin, which exists in certain African tribes. This appears to be the only example in human genetics where some inkling of the selective forces operating is known. As Allison has argued, the heterozygote "sickle trait" appears to offer protection against falciparium malaria and the gene is thereby maintained in the population. Neel also discusses the relationship of this system to the hemoglobin *C* gene, and genes detering the presence of rarer hemoglobin types.

In the opinion of the reviewer the study of other polymorphic systems, analogous to the hemoglobins, provides a particularly important area for further investigation. The genetically determined haptoglobins (the hemoglobin-binding proteins of serum) first identified by Smithies, and the primaquine sensitive red blood cells studied extensively by Alving and his group in Chicago, are two such systems on which work has begun.

This book provides a statement of the present state of knowledge of human selection and indicates the vast area for exploration. It is recommended to those interested in these problems. The papers were well selected, and the editing is of a high standard.

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Live at Peace with Your Nerves: Walter C. Alvarez, Prentice Hall, Englewood Cliffs, New Jersey, 1958, 267 pp.

Books of this type always bother me. They bother me, first, because the flood of such do-it-yourself happiness books suggests that the level of emotional upset in the country is high and the need for help is not being met. They bother me also because they rarely offer real understanding and, in place of meaningful considerations of emotional problems, purvey homily and platitude.

"Live at Peace With Your Nerves" stands perhaps a small cut above the average, but it is so filled with the ever-present clichés and rules-of-thumb by which Your Iife May Be Guided that whatever strong features may have originally been present, as a byproduct of Dr. Alvarez' 53 years of medical practice, are sunk without a trace. The dust jacket sets the tone: *"In layman's language,* Doctor Alvarez, Consultant Emeritus for the famed Mayo Clinic, shows you how you can *take command* of your nervous system, *eliminate* the nerve-caused aches and pains that make your life miserable. He gives you the *simple rules* that will brighten those dismal blue days . . . that may *save* you thousands of dollars, years of needless worry and suffering. . . ." (The underlined words appear in *red* on the dust jacket to make it easier to follow the simple rules).

Undoubtedly in large measure a result of the lay audience to which this book is directed, involved concepts are diluted and questionable theories are rendered clear-cut and simple. Nowhere is this better illustrated than in the chapter titled "Maybe you inherited bad nerves." The cheery thought that "bad nervous inheritance" need not mean a hopeless downward path sends the patient happily on his way. "When I feel that a very nervous person is probably more nearly psychotic than neurotic," Dr. Alvarez observes, "and when I am fairly certain that he has inherited his neurotic traits from some psychotic relatives, I do not look upon him as hopeless. Often I say to him, 'I expect you will always have to fight nervousness, but I see no reason why you should ever go insane. You are much too sensible and well-controlled for that.'"

Dr. Alvarez goes on to describe the possible reaction a patient has to these thoughts: "Perhaps as they look around at the several types of nervousness that appear in their brothers and sisters, they will say 'That's right, Alice got Mother's excitable temper; Ethel got Mother's sick headaches; Bill got her tendency to look on the discouraging side of things; and I got her tendency to insomnia.'" Now, *there* is gene specificity! It is fortunate that he ends this chapter on bad nerves with a suggestion that people interested in heredity counseling consult the American Eugenics Society publication on that topic by Helen G. Hammons.

The above quotes serve to illustrate the type of material which fills the book, often disappointingly trite, occasionally sound, generally hollow. It never did *take command* of my interest.

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APPLICATIONS OF DEMOGRAPHY; THE POPULATION SITUATION IN THE U.S. IN 1975. Donald J. Bogue, editor. Studies in Population Distribution, No. 13. Scripps Foundation for Research in Population Problems, Miami University, Oxford, Ohio; and Population Research and Training Center, University of Chicago; 1957; vi, 96 pp.; $2.10.

This is a volume of interest both for what it contains and as a portent of what it might contain. At the 1957 meetings of the Population Association of America, three sessions were jointly entitled "Applications of demography," and a fourth dealt with "The population situation in the U.S. in 1975." Of some thirty-eight papers presented at the complete set of meetings, nineteen, constituting all but one of those included in these four sessions, are printed here. Readers desiring a more complete summary of their contents than can be attempted in this review will find abstracts of all nineteen in the July 1957 issue of *Population Index.*

Among the papers in the first category, none is itself an application of demography, but all bear in some measure on the relevance of demography to various fields of investigation. The papers can be grouped

according to the following scheme (which does not precisely correspond with the grouping used in the book): Three papers point out, respectively, that population research is useful for work in the areas of urban renewal, municipal administration and planning, and market analysis. Three argue that particular kinds of demographic data are valuable, namely, household and family statistics, tabulations for the farm population, and statistics for small areas. Two are concerned with demography in its relationship to economic problems, particularly the balance between resources and people, and focus in considerable degree on the approach that demographers should take to these problems. Themes that recur frequently through the eight papers are the importance of demographic projections for policy planning and a resultant admonition to demographers that they should become directly concerned with policy problems. Joseph L. Fisher, for example, favors "fairly active participation on the part of social scientists, such as economists and demographers, in analysis of policy and decision alternatives, beginning with the policy and decision problem and working from that to the relevant data and analysis in their respective fields rather than proceeding in the reverse order" (p. 20).

The paper by George J. Stolnitz on "Interrelations between economic development, levels of living and demographic trends" will probably be that of greatest interest to persons familiar with demographic research and theory, since it takes issue with what it perceives to be certain fundamental characteristics of past work in this field. On the basis of a review of certain recent developments in both industrial and less advanced countries, Stolnitz suggests that demographers have been too prone to emphasize the long run over the short run, population growth over population distribution, and gloomy prospects over favorable ones. Specifically, he calls for a reassessment of the theory of demographic transitions, which he finds of undoubted usefulness but still sufficiently uncertain in its meaning and implications to warrant caution in attempts to apply it in the analysis of current problems. To the general import of all these papers, that demographers have much to do, Stolnitz adds the exhortation that they should bring to their work a "more determinedly unpessimistic approach" (p. 12). This reminds the reviewer vaguely of a call for more "enthusiasm" that was heard in another field a few years ago, but it does strike a refreshing note and is a suggestion not to be dismissed out of hand. It would seem to be in harmony with the positive component that informs much current thinking about eugenics.

The net effect of the papers on the application of demography is a demonstration that demography has wide implications. If the papers were a little less miscellaneous in character and had time in which to develop more concrete illustrations of instances in which demography has been valuable, the case would be made even more strongly. At times readers may feel that assertions of the breadth of demography are in fact invitations to demographers to operate beyond the borders of their subject, but this is a taxonomic point of no particular significance.

In the second section of this volume are eleven papers, varying in length from one to eight pages, that were compressed into little more than an hour's time at the Population Association meetings. Among the subjects covered are: population size, age and sex composition, color and nativity composition, and distribution by region and type of residence; size and distribution of standard metropolitan areas; labor force, farm population, and agricultural labor force; journey to work; school and college enrollment; marriage and housing; highway and traffic fatalities; and the aged population. Though one or two of the topics are rather peripheral, it is of interest

to have collected in one place some of the thinking of workers in various specialized areas. One fears that there may be a tendency to take the papers as a group too seriously. They are not for the most part intended as thorough new investigations, and their joint implications are made somewhat unclear by the circumstance that they are the product of many independent individuals whose methods and assumptions, though sometimes interrelated, have not been made consistent. As a quick summary of some leading present trends, however, and as a possible point of departure for further research, the papers are a worthwhile effort.

Comparing the contents of this volume with the abstracts that appear in *Population Index*, one is impressed that for people who are interested in the particular subjects discussed the availability of the full texts will be a real advantage. The editor is to be thanked for seeking out a way to achieve publication. What seems equally clear, as the first sentence of this review implied, is that some of the papers in the book have less potential interest and usefulness than other papers presented at the meetings but not included here. Students of eugenics, for example, would be glad to have the papers on health surveys and the presidential address on the aesthetics of population. Perhaps the Population Association might consider emulating the American Economic Association by adding a fifth number, the proceedings of its annual meetings, to its regular quarterly publication, the *Index*.

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THE UNIVERSITY TEACHING OF SOCIAL SCIENCES: DEMOGRAPHY. A Survey Prepared Under the Auspices of the International Union for the Scientific Study of Population: D. V. Glass, Editor. On the basis of regional and national reports contributed by: W. D. Borrie *et al.* Paris, UNESCO, 1957. 200 pp.

The position of demography as an academic discipline is far from fixed. Today, some thirty years after several lines of long-standing inquiry in medicine, statistics, political science, economics, sociology, and biological research coalesced as a separate study, the young science needs to expand. While the obvious dangers of the stepped-up rates of growth in world population have riveted the fascinated gaze of a large, frequently harangued, but not very well-informed public, the small body of trained demographers has grown slowly.

In recognition of this problem UNESCO in 1955 commissioned a self-study of the university teaching of demography, to parallel those of other social sciences. The present volume, produced by the International Union in less than twelve months, contains tentative generalizations and a summary by the members of the Committee, followed by a series of 13 regional reports, covering 29 countries. The coverage is nearly complete for Western Europe and Southeast Asia. The United States, about half of Latin America, and Australia are represented. Canada, New Zealand, all of Africa, and most of the Communist bloc are not.

The findings indicate that demographers in the reporting countries generally agree on what constitutes the core of their subject but not on its periphery. As to methodology, they agree on the fundamental statistical techniques but not on how to impart them and on what else the demographer should do. The organization of university teaching into which the demographers must fit also differs strikingly from country to country.

The special techniques of demography can be mastered in a fairly short period of intensive training by those with a groundwork of statistical methods, but before valid analyses and reconstructions of raw data can be produced a much longer period is required to season the judgment and be-

come conversant with the literature and the interrelated disciplines. Accordingly, three types of university teaching of demography are needed: the introductory survey; advanced undergraduate study coordinated with other disciplines; and the graduate training of specialists in demographic research. Space forbids the detailed examination of the practices described in the regional reports, apart from that on the United States by Otis Dudley Duncan.

From a sample survey of the 1950-1951 catalogues of about 900 liberal arts institutions in the United States, it appeared that about two-fifths of the institutions offered some course in demography, usually a single course in the Department of Sociology. Only ten per cent of the offerings were for graduate students only, and less than half of all the courses offered were taught by members of the Population Association of America. From replies to a mail questionnaire in 1953 the typical course emerged as an elementary one for third- or fourth-year undergraduates, dealing principally with substantive data on the United States, mixed sometimes but not always with a parallel emphasis on methodology. Most relied on a textbook, with supplementary use (in descending order) of U.S. census data, *Population Index*, U. S. vital statistics data, the *United Nations Demographic Yearbook*, and other reference material. As for advanced study, in the years 1946-1954 six per cent of the Ph.D. degrees in sociology dealt with demographic subjects, and four per cent of the Masters' degrees. No count was available of demographic dissertations in other departments, and no degree was awarded by a department of demography.

The lack of earlier figures gives little basis for estimating change. Since the surveys cited were made, the Population Council has come into being and the Population Research and Training Center at the University of Chicago has been organized, raising to five the number of research institutes devoted to demography in universities of the United States. These, the influence of international organizations interested in population, the expected appearance of several textbooks now in the making, the incentive of widening opportunities for trained demographers, all should help to bring about a better academic report card for the profession when in a few years' time the International Union resurveys the field.

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PERIODICAL REVIEWS

GENETICS

Anthropological observations on the children of an incestuous union. Fingerprints and palms. M. Weninger. *Acta Geneticae Medicae et Gemellologiae* **7** (1958), pp. 25-43.

Siblings whose genetic differences are half as great as normal because of inbreeding may be as dissimilar in their fingerprints by usual criteria as ordinary siblings. This study employed legal records including the finger and palm prints of four children and a baby, their mother and grandfather, and their father, who was also the mother's father.

When the four elder children were compared by finger ridge counts, the average difference was so large (85) as to suggest no relationship closer than that of ordinary siblings. In contrast, the palm prints were as similar as those of identical twins. The children naturally showed much closer resemblance to their father-grandfather than to their grandmother, but some of their traits were found in none of the three examined antecedents. The children had a high frequency of rare finger and palm patterns which may be regarded as minor defects due in this family to inbreeding.

Ataxia-telangiectasia. A familial syndrome of progressive cerebellar ataxia, oculocutaneous telangiectasia and frequent pulmonary infection. E. Boder and R. P. Sedgwick. *Pediatrics* **21** (1958), pp. 526-553.

This newly recognized, probably rare childhood disease begins at about one year of age with excessive swaying on sitting or standing. Differentiation from true cerebral palsy can be made as the disorder progresses, and especially with the gradual appearance, at 3 to 6 years, of permanent "pink-eye" and visible small blood vessels in the skin beside the nose. Before antibiotics, most cases probably died early of pneumonia, and even now the lungs tend to become chronically infected. The mental state remains normal, the mood cheerful, but motor functions, including speech, deteriorate. Four deaths among the author's 8 cases occurred between ages 9 and 25.

The authors state that the observed incidence, 8 among 15 children in 5 families, is twice that expected for a recessive trait. But this incidence necessarily excludes families where the parents were both carriers and, by chance, all children escaped the disease. A crude but useful correction is to discount the first case in each family, which in this instance leaves 3 affected among 10, consistent with the 25 per cent required for recessive heredity.

Thoughts on the mechanism of some spontaneous mutations in man. F. Vogel. *Zeitschrift für menschliche Vererbungs- und Konstitutionslehre* **34** (1958), pp. 389-399.

Mutations producing chondrodystrophic dwarfism, at least in one of its forms, appear to result from a hitherto unsuspected process. Chondrodystrophy occurs more often in babies with older fathers. This seems at first to fit the "copy-error" theory of gene mutation, according to which mutations result from faulty duplication of genes in cell division. For the cells that

give rise to sperms continue to divide throughout a man's reproductive life, so that any errors in gene duplication should accumulate in these cells as the father ages and become increasingly frequent in his later-born children.

Vogel finds, however, that risk of chondrodystrophy increases too rapidly and too unevenly with the father's age to match what is known about germ cell division. Other dominant mutations, once thought to show no paternal age effect, now are found to show about what would be anticipated from the copy-error theory. Chondrodystrophy seems to call for a new and special theory of mutation, applicable to a limited group of genes.

Haemoglobin E syndromes in a Ceylonese family. N. Nagaratnam *et al. British Medical Journal* **1** (1958), pp. 866-868.

A father and three of his five children were found to have an abnormal blood pigment known as hemoglobin E. Although carriers of the trait are generally healthy, these three children had anemia, fatal in one. The authors explain the unusual occurrence of symptoms in these carriers by assuming that the mother carried and passed on to them the gene for Mediterranean anemia.

Hemoglobin E in Southeast Asia, like sickle-cell hemoglobin in Africa, occurs commonly and without ill effects in heterozygous carriers (persons having two unlike genes for hemoglobin). These carriers have enough normal hemoglobin to prevent untoward symptoms. Heterozygous carriers of the gene for Mediterranean anemia are also healthy, but this gene has the effect of reducing the quantity of normal hemoglobin. In combination with a gene for abnormal hemoglobin the gene for Mediterranean anemia apparently brings out symptoms by increasing the proportion of abnormal pigment. However, assumption of a Mediterranean anemia gene in this family does not explain all the reported findings, and a more novel phenomenon may be responsible.

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Three chromosome numbers in Whites and Japanese, Masuo Kodani. *Science* **127,** (1958), pp. 1339-1340.

The number of chromosomes in the testes of 15 Japanese and 8 American Whites was determined by examining Feulgen-squash preparations of spermatogonial and first meiotic metaphase cells. The spermatogonial metaphases of 9 of the 15 Japanese showed 46 chromosomes, and correspondingly, the metaphases of the first meiotic divisions, for these individuals, showed 22 bivalents and the heteromorphic *X-Y* pair. The testes of one of the Japanese showed 47 chromosomes in the spermatogonial and first meiotic metaphases. In the latter metaphases a small autosomal univalent was seen in addition to 22 bivalents and the *X-Y* pair. In 5 of the testes, 48 chromosomes were found. The autosome found singly in the 47 chromosome individuals had a homologue in the 48 chromosome individuals.

Only 1 of the 8 testes taken from American Whites showed 48 chromosomes. The number in the remaining 7 was 46. The size, shape, and pairing relationships of the individual chromosomes in the 46 and 48 chromosome American whites were essentially the same as those in the Japanese with the corresponding number.

The author states that since this study showed American Whites with 46 and 48 chromosomes, it can be concluded that some Whites must also have 47 chromosomes, and therefore, three chromosome number exist in Whites and Japanese. The author concludes further that the autosomal supernumerary chromosome present singly in 47 chromosome individuals is metacentric

with the centromere located near its middle, never pairs or associates with any chromosome except its own homologue, and is approximately the same size as the *Y* chromosome. The number of Japanese and American Whites studied so far is too small to give a reliable estimate of the ratio of 46 to 48 chromosome individuals in each ethnic group and to determine if any true difference exists between these groups.

Human somatic chromosomes. C. E. Ford, P. A. Jacobs, and L. G. Lajtha. *Nature* **181** (1958), pp. 1565-1568.

The authors present data on the number of chromosomes in the human somatic cell which are not in accord with the findings of Kodani (see previous abstract).

Chromosome counts were made on human marrow cells obtained by sternal puncture and prepared by the Feulgen-squash technique. Colchicine was applied to the cells after removal in order to arrest the dividing cells at metaphase and help disperse the chromosomes. The marrow specimens were taken for normal clinical purposes from 22 patients at Churchill Hospital, Oxford, England. Counts made on different cells from one individual showed variation which the authors say could be attributed to inadequate fixation, staining, and spreading of the chromosomes, early division of the centromere, or ruptured chromosomes due to the squash technique of preparation. Yet, the modal number for each individual was consistently 46 and never greater. The authors report that excluding Kodani's cases, combining their data with other recently reported cases in the literature and unreported cases obtained from other investigators, gives a total of 60 human individuals in which the chromosome number has been determined to be $2n=46$. Counts made on both somatic cells and primary spermatocytes are included. They conclude that on the basis of their findings there is no evidence for a supernumerary chromosome in Whites.

Studies in the human sex ratio. 5. A Genetic explanation of the wartime increase in the secondary sex ratio. Marianne E. Bernstein. *The American Journal of Human Genetics* **10** (1958), pp. 68-70.

A subject often debated in the literature is whether there is a marked rise in the proportion of male births toward the end or immediately following a major war. Those who have accepted the reality of this phenomenon have not always agreed as to the causes. Explanations in the past have usually centered around the known fact that most stillbirths are males and any factor increasing the probability of survival of the fetus would consequently increase the proportion of male births. One explanation has been the possible better health of the mother during wartime since the interval between births may be greater.

The author presents data suggesting that the increase in the proportion of male births during this time may have a genetic explanation. A sample of 200 families was selected from "Wer Ist," the German "Who's Who," in which the parents were married between 1900 and 1917. The parents were classified as "more quickly fertile," or "more slowly fertile" on the basis of whether the first child was born during the first 18 months following the date of marriage or at a later date. A total of 1,178 children was born to the more quickly fertile parents, and of this number 55.3 per cent were males; whereas, only 49.8 per cent of 822 children born to the more slowly fertile parents were males. The 5.5 per cent difference is significant at the 2 per cent probability level.

The author concludes that since the opportunity for fertilization is decreased during wartime in a large segment of the population because husbands are away in the armed forces, except for short leaves, pro-

portionally more children will be born to the more quickly fertile parents during and after the war. Since these parents, for genetic reasons, tend to have proportionally more sons, the frequency of male births in the population will be increased during this period.

Blood groups and fertility in a Japanese population, with special reference to intra-uterine selection due to maternal-foetal incompatibility. E. Matsunaga and S. Itoh. *The Annals of Human Genetics* **22** (1958), pp. 111-131.

Families were studied from two mining towns, Ashibetsu and Kohnomae, in Hokkaido. Blood specimens were taken from parents and information was obtained on the number of living children, pregnancies and spontaneous abortions. Since the two towns were homogeneous in regard to the distribution of each blood group, as well as mating types, the data were pooled for the final statistical analyses. The total number of families studied was 1429.

The matings were classified as incompatable or compatible for the ABO system on the basis of whether the mother could or could not possess a naturally occurring antibody specific for an antigen found in the fetus. For example, the mating O ♀ × A ♂ was classified as incompatible, while the reciprocal, A ♀ × O ♂ was classified as compatible.

Noteworthy differences, suggesting maternal-fetal incompatibility, were observed for the two types of mating groups. A highly significant reduction in the mean number of living children was noted for the incompatible matings. This observation coupled with a highly significant increase in the number of abortions per pregnancy and childless couples for this same mating group, indicates that selection could be operating to reduce the frequency of the genes responsible for the A and B antigens in this Japanese population. This would increase the frequency of O individuals. Selection against the heterozygote has the effect of reducing the frequency of the gene which is less common.

As a compensating mechanism, leading to some sort of equilibrium, the authors present data suggesting that the mean number of pregnancies and living children is higher in A × A, than in A ♀ × O ♂, or AB ♀ × O ♂ matings. Furthermore, among the compatible matings, the mean number of pregnancies and living children was lower when the father was O. Selection in these latter cases would have the effect of increasing the frequency of the genes responsible for the A and B antigens, thus decreasing the freguency of O individuals.

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POPULATION

Trends in class fertility in Western nations. Dennis H. Wrong. *Canadian Journal of Economics and Political Science* **24**, 2 (May 1958), 216-229.

Using the cumulative birth rate as its chief measure of fertility and occupational category as its principal means of distinguishing among social classes, this report attempts a synthesis of the trends in class differentials in fertility in four Englsh-speaking, three Scandinavian, and three other European countres. Three time periods are recognized. From the beginning of the decline in Western birth rates, about 1870, to 1910 the inverse relationship between fertility and socio-economic status became greater and more consistent, probably attaining its greatest strength in the history of Western civilization. Within some status groups a positive correlation between income and fertility probably existed even at that time.

Between 1910 and 1940, leadership in the rate of decline in fertility apparently passed

from the upper to the middle classes. Though the inverse correlation between socio-economic status and fertility continued on the whole, it diminished in strength and many more exceptions occurred than in the earlier period. Examination of family size by income rather than occupation discloses instances in which the relationship between fertility and economic status took the form of a reversed *J* or even a *U*. After 1940 there occurred the baby boom, in which all groups appear to have participated, but in such relative degree as to accelerate the narrowing of fertility differentials.

The author subscribes to the view that the trends in class fertility differentials are the result of the gradual diffusion of contraceptive practices through the society, but he points out that much further research will be needed to explain the relationship between class and fertility. As to the future, it is his conjecture that the disappearance of class fertility differences is more likely than the emergence of a positive correlation between fertility and status.

In presenting his findings, the author has relied here entirely on qualitative statements. Some readers, including the reviewer, would find the discussion more satisfying if it included, from the larger study of which it is a part, some indications of the numerical dimensions of the trends and differentials under investigation.

Population growth and employment requirements, 1951-66. V. R. K. Tilak. Reprinted from *Employment News* [New Delhi] **3**, 8 (April 1958). 5 pp.

On the basis of the 1951 census, corrected for the underenumeration of young children, and survivorship rates obtained from the All India Life Tables for 1941-50, the population of India by sex and five-year age groups is projected at five-year intervals from 1956 to 1966, omitting persons born after 1951. From the population projections, labor force projections are derived on the assumption that the age-sex participation rates of the National Sample Survey (Draft Report No. 14) will remain fixed throughout the projection period. The results show an increase in the total size of the labor force from 150 million in 1951 to 175 million in 1966. Each age-sex group increases in size in every one of the five-year projection periods. The average annual increase in the labor force ranges from about 1.6 to 1.7 million.

The author points out that the problems of the growing labor force extend beyond the need to provide employment for this many additional persons. Since the net increase in the labor force is the difference between the number entering and the number leaving, it is of interest to examine the number of new entrants to be expected each year, persons for whom some training in the filling of their positions will often be be necessary. According to Tilak's estimates, the average annual number of new entrants will range from 5.2 millions between 1951 and 1966.

The reviewer would add that the method used to derive these figures would appear, if anything, to understate the numbers of new entrants, since it depends on the gross differences between the number present in the labor force in each age-sex group and the number five years earlier in the next younger age group of the same sex.

The population problem. Tachi Minoru. *Japan Quarterly* **5**, 1 (January-March 1958), 103-112.

In this article the chief of the General Affairs Section of the Japanese Institute of Population Problems presents some of the main features of contemporary Japanese demography. From 35 million in 1872 and 70 million in 1936 the population of Japan has risen to an estimated 91 million in 1957, a size exceeded by only four other

nations: China, India, Soviet Russia and the United States. The population density is third only to those of the Netherlands and Belgium.

The death rate has fallen from 23.0 per thousand in 1920-24 to 14.6 in 1947 and 8.0 in 1956, principally because of the decrease in deaths from infectious diseases. The birth rate started to decline about 1920, but so slowly that the falling mortality maintained and even raised the crude rate of natural increase, which reached a peak of over 20 per thousand in the baby boom years of 1948-49. Since 1950, however, the birth rate has declined radically from its 1947 peak of 34.3 to a 1956 estimated value of 18.4. Maintenance of present patterns of fertility and mortality would eventually result in virtual cessation of population growth.

Tachi attributes the decline in the birth rate to impoverished conditions and to endeavors to raise living standards. Extensive use of abortion, encouraged by liberalization of laws relating to its employment, has been followed by programs to spread contraceptive information and materials. It appears that abortions are now declining in numbers while family planning is gradually spreading.

An important feature of the Japanese population structure is the rising average age that results from declining fertility. This brings with it problems of old-age dependency and, most important, of an increasing labor force requiring employment. Tachi points out that this matter is more serious than might be thought, since present reported levels of unemployment mask a high percentage of underemployment. The situation will become aggravated in the likely event that the added numbers in the labor force are absorbed chiefly by small, relatively inefficient, enterprises.

Population pressures in Japan. Akira Doi. *Current History* 34, 200 (April 1958), 205-207.

Part of a group of papers collectively entitled "Report on Japan," this paper covers somewhat more briefly than that of Tachi (above) certain highlights of the demographic situation in Japan, and then proceeds to a consideration of economic aspects of a solution for Japan's population pressures. As an indication of the relative intensity of these pressures, Doi notes that the Japanese population density of 1,773 persons per square kilometer of cultivated land is to be compared with 711 for the British Isles and 86 for the United States. Yields per acre are high in Japan, but the shortage of food is still serious. Although the annual rate of growth has fallen from 2.02 per cent in 1946-50 to 1.04 in 1956 as a result of the sharp decline in the birth rate, the population is likely to continue to increase until at least 1990.

Like Tachi, Doi places particular stress on the fact that the labor force will grow at a faster rate than the total population. In his estimation an annual increase in the gross national product of 6.5 per cent will be necessary to support the newly created labor force as well as the existing unemployed. To achieve such increases in production, if it is possible at all, will require substantial expansion of both exports and imports. "In assessing the future of Japan, it will be important to seek economic development through international cooperation to pave the way toward a reasonable solution for the population difficulties."

Japan's population problem: a positive approach. Robert H. Amundson. *Review of Social Economy* 15, 2 (September 1957), 104-117.

Writing in a Roman Catholic journal, Amundson observes that many treatments of the Japanese population problems have been concerned with "neo-Malthusian" proposals and have involved "a series of heated exchanges between some moralists

untrained in demography, and some demographers who are either ignorant of or explicitly deny the ethical implications of the problem."

Examination of current demographic changes and of post-war land reforms in Japan leads to the conclusion that neither of these developments offers reasonable assurance of reduced population pressure. Attention then turns to restrictions on Japanese trade and on the immigration of Japanese into other countries as impedimenta to a solution of the problem. It is asserted that in view of the declining birth rate, emigration might be a more effective way of reducing population pressure in Japan than in some other area. Amundson concludes that "population pressure in Japan can be eliminated only if the free nations take steps to insure her economic stability by joint trade agreements, formation of capital reserves, direct economic aid for modernizing Japan's industry, and lowering discriminatory immigration barriers." Both moral considerations and the danger that population pressure holds for world peace are adduced to support the adoption of such a program.

Christian theology and the population problem. John L. Russell. *The Month*, New Series **19**, 4 (April 1958), 197-208.

This article, like that discussed above, approaches population questions from a Roman Catholic point of view. Here, however, the author is concerned not with the immediate difficulties of a single nation, but with the long-run population problem of the whole earth, which he formulates as follows: "Any population which shows a steady rate of increase will eventually outrun its food supply, and ultimately will outrun any possible or conceivable food supply." After presenting a few arithmetic examples designed to demonstrate that the present rate of world population growth cannot have been typical of past history and cannot be expected to continue indefinitely, Russell examines in turn various possible resolutions of the present difficulty.

The view that in the nature of things all will automatically turn out well is considered first, and rejected, but with the observation that though there is no certainty that the population problem can be solved, it is not impossible that a solution may be found. Hence one should be sought. Migration to other parts of the universe is regarded as inadequate; dependence on the possibility that the world may end before the population problem becomes desperate is found to be unjustified. It follows that a solution must involve stabilization of population growth, which implies, in turn, either increased death rates or decreased birth rates. Since the first of these two is hardly an ideal solution, only the latter remains.

The author takes it for granted that contraception is intrinsically wrong. Furthermore he doubts that it would be effective in any case because of the segments of the population that would not want to limit their families. The safe period also seems to be doubtful as either an ideal or a practical solution. In addition, it is doubted that such families as exist ought to be too small. The only remaining alternative then, is for a substantial portion of the population to lead celibate lives, which would be possible only in a Catholic community. Hence "the only real answer is that the whole world should become Christian in the course of the next century or so."

Though non-Catholic readers will disagree with the author at more than one point in his argument, this article seems to the reviewer to very useful for its succinct attempt to state the logical implications of certain value judgments. The recognition that there is a population problem to be solved, and the very limited importance assigned to the rhythm method as a solution to this problem will be noted

sympathetically by persons of many persuasions.

Some thirteenth-century censuses. H. E. Hallam. *Economic History Review*, Second Series **10**, 3 (April 1958), 340-361.

This article is an analysis of censuses of bondsmen belonging to the Benedictine priory at Spalding, Lincolnshire, dating from about 1270, and of certain other data from the same period. The average size of household observed, 4.37 persons, is rather larger than reported in some earlier studies. An examination of family structure suggests, none-the-less, that the nuclear, rather than the extended, household predominated, with three-generation families rare. The principal point developed by the author is the relevance of inheritance customs to family size. Where partible inheritance was usual, that is, where land might be divided among a man's children, earlier marriage, less emigration, and larger family size seemed to be found that in areas characterized by single inheritance. Partible inheritance is thus seen as a contributor to population growth.

What the reviewer particularly misses in this discussion is attention to questions of sampling and to the statistical significance of the results that are presented.

A note on the economics of birth control. Henry H. Villard. *Review of Economics and Statistics* **40**, 1, Part 1 (February 1958), 78-79.

On the basis of what appear to be rather rough-and-ready assumptions as to amounts of intercourse and as to costs, the author computes that the direct cost of birth control that would maintain levels of living in India would be about 10 per cent of the cost of providing for the increase in population that would take place without this birth control. He assumes the use of an existing contraceptive device, not specified, that is "90 per cent effective." The "indirect cost" of introducing contraceptive techniques might, he feels, be appreciable in some areas, but still less than anticipated, at least in many instances. Though population problems are a long way from solution, in short, the solution is not blocked by lack of suitable techniques or by their cost.

Though the situation described may prove to be the case in the near future, the reviewer would have found the presentation more convincing if the cost data were more precise and if more adequate information as to the acceptability of the contraceptive device proposed had been included. A point that would bear further consideration is the meaning of "90 per cent effective" in describing a method of contraception.

Population growth and its impact on geographic education. Phillip Bacon. *Journal of Geography* **57**, 3 (March 1958), 111-119.

The purpose of this article is to suggest that present demographic trends render much of the teaching of geography in American schools inadequate. It is noted that the population of the world at the opening of the twenty-first century will probably be more than twice what it is today, with much of the intervening growth occurring in non-Western nations. To this is added the observation that children entering school from now on will spend a significant part of their lives in the next century. From these premises the author concludes that geographical education should have a much less local emphasis than at present, because "we can scarcely continue to tolerate loyalties that do not extend beyond our borders." Two further matters that the reviewer would like to see included in a list of topics worthy of study by geography teachers are these: the possibility that the increase in world

population that would result from an extrapolation of recent growth rates may not occur because of substantial rises in death rates; and the usefulness of an approach to the population problem that stresses international tolerance without considerable emphasis on the fact that the world operates as a collection of only partially interrelated segments.

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*Excellence in a Democracy**

It is now widely recognized that our society has given too little attention to the individual of unusual talent or potentialities. To make such an assertion is not to deplore the unprecedented time and money we have devoted to raising the general level of achievement. It would serve no purpose to replace our neglect of the gifted by neglect of everyone else. We are all too prone to such wild swings of the pendulum in our national life. We must learn to view these matters in a perspective which will permit us to repair one omission without creating others.

It has not always been easy for Americans to think clearly about excellence. At the heart of the matter is a seeming paradox in democracy as we know it. On the one hand, ours is the form of society which says most convincingly, "Let the best man win," and rewards winners regardless of origin. On the other, it is the form of society which gives those who do not come out on top the widest latitude in rewriting the rules of the contest. It is crucial to understand this tug of war between equality and excellence in a democracy. When the rewriting of the rules is prompted by the standards of fair play, by elementary considerations of justice, by basic value judgments as to what sort of a "best man" the society wants, democracy can have no quarrel with it. Indeed, it is the core process of a democracy. But when the rewriting of the rules is designed to banish excellence, to rule out distinguished attainment, to inhibit spirited individuals, then all who have a stake in the continued vitality of democracy must protest.

Every democracy *must* encourage high individual performance. If it does not, it closes itself off from the main springs of its dynamism and talent and imagination, and the traditional democratic invitation to the individual to realize his full potentialities becomes meaningless. More, perhaps, than any other form of government, a democracy must maintain what Ralph Barton Perry has called "an express insistence upon quality and distinction."

The eighteenth-century philosophers who made equality a central term in our vocabulary never meant to imply that men are equal in all respects. Nor do Americans today take such a view. It is possible to state in fairly simple terms the views concerning equality which would receive most widespread endorsement in our country today. The fundamental view is that in the final matters of human existence all men are equally worthy of our care and concern. Further, we believe that men should be equal in enjoyment of certain familiar legal, civil and political rights. They should, as the phrase goes, be equal before the law.

But men are unequal in their native capacities and their motivations, and therefore in their attainments. In elaborating our national views of equality, the most widely accepted means of dealing with this problem has been to emphasize *equality of opportunity*. The great advantage of the conception of equality of opportunity is that it candidly recognizes differences in endowment and motivation and accepts the certainty of differences in achievement. By allowing free play to these differences, it

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preserves the freedom to excel which counts for so much in terms of individual aspirations and has produced so much of mankind's greatness.

Having committed ourselves to equality of opportunity, we must strive incessantly to make it a reality in our society. . . .

With respect to the pursuit of excellence there are several considerations that we must keep firmly in mind.

First, we must not make the mistake of adopting a narrow or constricting view of excellence. *Our conception of excellence must embrace many kinds of achievement at many levels.* There is no single scale or simple set of categories in terms of which to measure excellence. There is excellence in abstract intellectual activity, in art, in music, in managerial activities, in craftsmanship, in human relations, in technical work.

Second, we must not assume that native capacity is the sole ingredient in superior performance. Excellence, as we shall later have occasion to note, is a product of ability and motivation and character. And the more one observes high performance in the dust and heat of daily life, the more one is likely to be impressed with the contribution made by the latter two ingredients.

Finally, we must recognize that judgments of differences in talent are not judgments of differences in human worth.

To sum up, it is possible for us to cultivate the ideal of excellence while retaining the moral values of equality. Whether we shall succeed in doing so is perhaps the fundamental issue in the development of our human resources. A challenge must be recognized before it can be met. Our society will have passed an important milestone of maturity when those who are the most enthusiastic proponents of a democratic way of life are also the most vigorous proponents of excellence.

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